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into the Decline of
Sockeye Salmon in the Fraser River



Commission d'enquête
sur le déclin des populations
de saumon rouge du fleuve Fraser



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The Uncertain Future of Fraser River Sockeye

Volume 1 • The Sockeye Fishery



Final Report – October 2012

The Honourable Bruce I. Cohen, Commissioner

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October 29, 2012

To His Excellency
The Governor General in Council

May it please Your Excellency:

As Commissioner appointed by Order in Council PC 2009-1860, which was promulgated on November 5, 2009, pursuant to Part I of the *Inquiries Act*, and in accordance with the Terms of Reference assigned therein, I respectfully submit my final report.

The report sets out my findings resulting from public forums and submissions, the extensive review of documents, the conduct of evidentiary hearings, and the careful consideration of participants' submissions.

I trust that my report will contribute to an improved understanding of Fraser River sockeye salmon, and that my recommendations will improve the future sustainability of the sockeye salmon fishery in the Fraser River.

I consider it a privilege and an honour to have served as Commissioner.

The Honourable Bruce I. Cohen
Commissioner

COHEN COMMISSION OF INQUIRY
into the Decline of Sockeye Salmon in the Fraser River

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Preface

In November 2009, the Governor General in Council issued Order in Council 2009-1860, establishing this Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River and appointing me, Bruce Cohen, sole Commissioner under Part 1 of the *Inquiries Act*. The Report of this Inquiry consists of three volumes. I describe the Terms of Reference of this Commission in Volume 1, Chapter 1, and set them out in full in Appendix A to each volume of this Report.

In Volume 1, *The Sockeye Fishery*, I set out the background information necessary for the reader to understand the complexity and breadth of the Fraser River sockeye salmon fishery. The chapters in Volume 1 cover several topics:

- an overview of the Commission's mandate;
- a description of the life cycle of the Fraser River sockeye salmon;
- an overview of the legal framework governing the Fraser River sockeye fishery;
- an overview of the organizational structure of the Department of Fisheries and Oceans (DFO);
- a description of the management of the Fraser River sockeye fishery;
- a description of the management of the Fraser River sockeye habitat;
- a description of DFO's enforcement activities related to the fishery and fish habitat;
- an overview of the management of salmon farms – an activity that may affect Fraser River sockeye;
- an overview of fish health management related to wild and cultured fish;
- a discussion of DFO's Wild Salmon Policy; and
- a case history of the Cultus Lake sockeye salmon.

Some subject matter is repeated among the chapters and volumes. Often, to describe aspects of how the fishery is managed (as set out in Volume 1), it is necessary to describe the technical and scientific information upon which management decisions are based. That scientific evidence may be repeated in Volume 2 in discussing the causes of the decline.

In Volume 2, *Causes of the Decline*, I focus on that section of the Terms of Reference (section C(1)) directing me to investigate and make independent findings of fact regarding the causes of the decline of Fraser River sockeye. I summarize the public submissions I received regarding the causes of the decline, other investigations into the decline, as well as the scientific reports prepared for the Commission exploring the different possible causes of the decline. I also discuss the testimony of numerous witnesses, many of whom were qualified as experts in their fields. Volume 2 includes a summary of the findings of fact I make regarding the possible causes of the decline of the Fraser River sockeye salmon.

Volume 3 contains my recommendations based on my review of the evidence and my findings set out in volumes 1 and 2. I also discuss Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which was introduced on April 26, 2012, after this Inquiry's evidentiary hearings had concluded, and which received royal assent on June 29, 2012. Bill C-38 amends the *Fisheries Act* and enacts a new *Canadian Environmental Assessment Act, 2012*. I summarize the provisions most relevant to the work of this Inquiry, record the views of the participants, and comment on the possible implications of Bill C-38 for Fraser River sockeye salmon and my recommendations respecting them. Volume 3 also provides an executive summary of this Report and a description of the Commission process.

Each volume includes appendices related to that volume. All three volumes contain the Terms of Reference, a glossary, and a list of abbreviations and acronyms.

A note about references to submissions and views of witnesses and participants

I refer to many views and opinions submitted by members of the public and participants in this Inquiry, to the testimony of witnesses, and to the documents and reports put before me. The issues dealt with in this Inquiry were the source of differing points of view. In many cases, the issues were matters of significant concern to the speakers or authors. In my effort to convey the intensity of these perspectives, I have quoted

submissions and evidence that may strike the reader as incorrect, and perhaps extreme. It is important for the reader to understand that I have been clear in the Report where I have made findings. The recitations of evidence and submissions are not findings. The reader should not interpret the reproduction or summary of evidence or submissions as my endorsement of any particular view.

A note about sources of information for this Report

Throughout this Report, I have tried to provide the reader with references to the sources of information I relied on by including a list of endnotes following each chapter. The sources are primarily documentary evidence (exhibits) and the testimony of witnesses (transcripts). I also refer to public submissions, which will be archived on our website (www.cohencommission.ca). Occasionally, I refer to legislation and judicial decisions, as well as policy and practice reports prepared by Commission staff. In exceptional cases where the evidence was insufficient to explain something, such as an aspect of DFO's organizational structure, I refer to websites. Although they are up to date as of June 30, 2012, it must be kept in mind that websites change over time or become unavailable.

This Report is accompanied by a DVD that includes the transcripts from the hearings along with exhibits, technical reports, legislation, case law, and policy and practice reports relevant to this Report. The DVD also includes my rulings on issues that arose during the hearings, the participants' submissions, and the Interim Report and Final Report. Detailed maps included in the Report are also on the DVD and can be enlarged when viewed electronically.

Where it might be useful, I have tried to provide the page numbers of the transcripts and exhibits that I rely on. For most documents, the page number corresponds to the original pagination. If the original document was unpaginated but pagination was applied through the process of its disclosure to the Commission (see Volume 3, Chapter 5, Commission process) or by virtue of its being a PDF file, I have provided the corresponding page number.

Chapter 1 • The Commission's mandate

■ Precipitating events

The sockeye salmon of British Columbia's Fraser River are iconic in Aboriginal and non-Aboriginal communities. They have sustained numerous Aboriginal communities and have been at the centre of Aboriginal traditions in this province for millennia. As well, Fraser River sockeye are an important resource in the province's economy, and a key component of its freshwater and marine ecosystems.

Thirty years ago, the Government of Canada established a wide-ranging inquiry to examine all Pacific coast fisheries, including Fraser River sockeye salmon.* Since then, the landscape has changed dramatically. Warming marine and river temperatures and changing snowpack-melting patterns have added to other stressors affecting the health and productivity

of Fraser River sockeye salmon. The Supreme Court of Canada and lower courts have made pronouncements on Aboriginal fishing entitlements under the Canadian Constitution, and on other aspects of fisheries management. Management of the Fraser River sockeye fishery has become more complex given competing claims by First Nations and stakeholders, changing policies and practices, and dozens of investigations and reports containing hundreds of recommendations.

Fisheries managers and fish biologists have identified a decline in Fraser River sockeye abundance and productivity since the early 1990s. In terms of abundance, Figure 1.1.1 illustrates that decline and places it in a broader historical context.

* The inquiry was called the Commission on Pacific Fisheries Policy. In 1982, Commissioner Peter H. Pearce produced *Turning the Tide: A New Policy for Canada's Pacific Fisheries, Final Report of the Commission*.

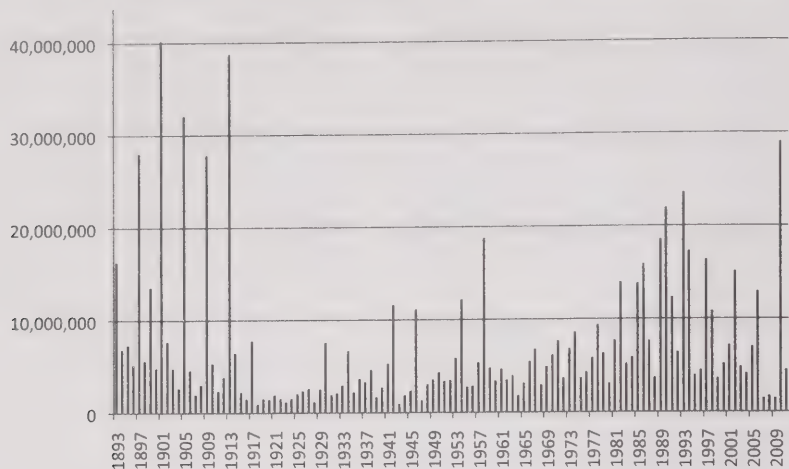


Figure 1.1.1 Total Fraser River sockeye returns, 1893–2011

Note: The Hell’s Gate rockslide in 1914 was a catastrophic event widely accepted as being responsible for the reduced returns in the following decades. The 2011 estimate is preliminary.
Source: Reproduced from Exhibit 1967, p.4.

In terms of productivity, a think tank of scientists organized by Simon Fraser University and the Pacific Fisheries Resource Conservation Council expressed the decline by comparing the number of adults returning to spawn (recruits) to the number of spawning adults four years previously (see

Figure 1.1.2). If the number of recruits is lower than the parental numbers, the stock would appear to be in decline. Between the early 1990s and 2009, there was a steady and profound decline, to the point where the number of recruits per spawner was well below the replacement level.

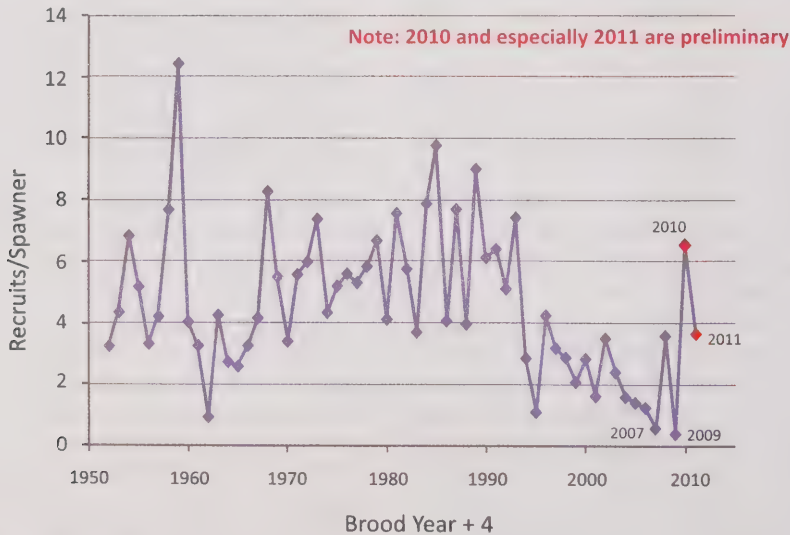


Figure 1.1.2 Annual variation in total Fraser River sockeye productivity, 1950s–2011

Source: Exhibit 1851.

The steady decline of this resource over the past several decades has put enormous pressure on Aboriginal and non-Aboriginal communities that depend on the sockeye salmon, whether for Aboriginal food, social, and ceremonial purposes, recreational pursuits, or livelihood.

In 2009, a record low number of sockeye salmon returning to the Fraser River led to the closure of the fishery for the third consecutive year, despite favourable pre-season estimates of the number of sockeye salmon expected to return. However, as figures 1.1.1 and 1.1.2 show, there was a dramatic improvement in both abundance and productivity in 2010 and, to a lesser extent, in 2011.

■ Establishment of the Commission

In November 2009, the Governor General in Council issued Order in Council 2009-1860 establishing this Commission of Inquiry and appointing me as sole Commissioner under Part 1 of the *Inquiries Act* to investigate this decline of sockeye salmon in the Fraser River.¹

The same Order in Council set the Commission's Terms of Reference. The Order in Council with complete Terms of Reference appears as Appendix A. In brief, the Terms of Reference direct me

- (A) to conduct the Inquiry without seeking to find fault on the part of any individual, community or organization, and with the overall aim of respecting conservation of the sockeye salmon stock and encouraging broad cooperation among stakeholders,
- (B) to consider the policies and practices of the Department of Fisheries and Oceans (the "Department") with respect to the sockeye salmon fishery in the Fraser River – including the Department's scientific advice, its fisheries policies and programs, its risk management strategies, its allocation of Departmental resources and its fisheries management practices and procedures, including monitoring, counting of stocks, forecasting and enforcement,

- (C) to investigate and make independent findings of fact regarding
 - (I) the causes for the decline of Fraser River sockeye salmon including, but not limited to, the impact of environmental changes along the Fraser River, marine environmental conditions, aquaculture, predators, diseases, water temperature and other factors that may have affected the ability of sockeye salmon to reach traditional spawning grounds or reach the ocean, and
 - (II) the current state of Fraser River sockeye salmon stocks and the long term projections for those stocks, and
- (D) to develop recommendations for improving the future sustainability of the sockeye salmon fishery in the Fraser River including, as required, any changes to the policies, practices and procedures of the Department in relation to the management of the Fraser River sockeye salmon fishery[.]

Although there have been several dozen examinations, investigations, and reports on various aspects of the Pacific fishery during the past three decades, this Commission's mandate is broader than the mandates of previous examinations. It calls for a consideration of all aspects of the policies and practices of the Department of Fisheries and Oceans (DFO)* in relation to the management of the Fraser River sockeye salmon fishery and an investigation – not limited to any one year's return – of the biological, ecological / environmental, and other causes of its decline. It is also the first Commission of Inquiry established under the authority of the *Inquiries Act* dealing with the Fraser River sockeye fishery since the 1982 Pearse Commission on Pacific Fisheries Policy.

■ Interpretation of the Commission's mandate

Several aspects of the Commission's mandate warrant preliminary comment.

* In this Report, the acronym DFO, and sometimes "the department," will be used to denote Fisheries and Oceans Canada.

Mandate to encourage broad co-operation among stakeholders

One of the provisions of the Terms of Reference unique to this Inquiry was the direction “to conduct the Inquiry without seeking to find fault on the part of any individual, community or organization.” Rather, I was mandated to encourage broad co-operation among stakeholders. I am pleased to report that throughout the Inquiry’s proceedings, counsel for the various participants, while vigorously advancing their clients’ interests, acted with a high degree of professionalism in adopting a collaborative and co-operative approach. This enabled the Commission to gather information and evidence upon which to build a better and clearer understanding about the past declines to place the Commission in a position to recommend the necessary steps and solutions for ensuring the future sustainability of the Fraser River sockeye salmon fishery.

Early in my mandaté, an application was made to interpret the direction “to conduct the Inquiry without seeking to find fault ...” In my ruling, I found that those words clearly directed me to conduct the Inquiry without focusing on assigning fault to any individual, community, or organization, and to encourage co-operation among the stakeholders. However, I also found that the direction did not preclude me from making any particular findings. In the event that the evidence led me to the conclusion that any individual, community, or organization had engaged in conduct that directly or indirectly was a factor causing or contributing to the decline of Fraser River sockeye salmon, or in conduct that was the basis for recommendations to change policies, practices, or procedures in relation to management of the fishery, the direction did not limit the scope of the findings or recommendations that I was able to make.

The full version of my ruling is found on the DVD accompanying this Report.

Causes of the decline of Fraser River sockeye salmon

The Terms of Reference direct me to investigate and make independent findings of fact regarding the causes of the decline of Fraser River sockeye salmon. Various biological and ecological issues

are enumerated, but the words “including, but not limited to” invite me to consider other possible causes as well.

The manner in which Fraser River sockeye stocks have been managed during the period of the decline is an important matter that warrants examination, for several reasons. First, the preamble to the Terms of Reference acknowledges that the decline “has been attributed to the interplay of a wide range of factors, including environmental changes along the Fraser River, marine environmental conditions and fisheries management.” Second, the Terms of Reference specifically direct me to consider the policies and practices of DFO with respect to the sockeye salmon fishery in the Fraser River, including:

- the department’s scientific advice;
- its fisheries policies and programs;
- its risk management strategies;
- its allocation of departmental resources; and
- its fisheries management practices and procedures, including monitoring, counting of stocks, forecasting, and enforcement.

Improving the future sustainability of the Fraser River sockeye fishery

The only matter on which I am invited to make recommendations to the Government of Canada relates to improving the future sustainability of the sockeye salmon fishery in the Fraser River. I must interpret that directive in a manner consistent with the other paragraphs of the Terms of Reference, which direct me to consider DFO’s policies and practices with respect to the Fraser River sockeye fishery and to make independent findings of fact regarding the causes of the decline of the Fraser River sockeye stocks.

The scope of my recommendations for improving the future sustainability of the Fraser River sockeye fishery will be informed by the breadth of my fact-finding mandate, and by the context in which that mandate was created – the decline of Fraser River sockeye stocks since the early 1990s. It is that decline that the Government of Canada seeks to reverse by instituting measures to improve the future sustainability of the Fraser River sockeye

fishery. I am invited to make recommendations to that end. The Terms of Reference specifically invite me to recommend changes to DFO's policies, practices, and procedures in relation to the management of the Fraser River sockeye salmon fishery. However, the word "including" leaves open the possibility of making recommendations on other matters as well.

Aboriginal rights and title

Although the Terms of Reference are silent on the matter of Aboriginal rights and title, this Commission of Inquiry respectfully acknowledges the special relationship that many First Nations have with Fraser River sockeye salmon. They have fished these waters for sustenance for millennia and, through their traditions, ceremonies, and traditional ecological knowledge, bring a unique perspective to bear on this Inquiry's work.

Aboriginal people also possess a unique legal status in relation to Fraser River sockeye, based on section 35 of the *Constitution Act, 1982*, which states "[t]he existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed."² For example, in 1990 the Supreme Court of Canada recognized for the first time, in *R. v. Sparrow*, an Aboriginal right to fish for food, social, and ceremonial purposes, and stated that such a right would be treated with priority, subject only to conservation.³

In addition, several historical and modern treaties negotiated between the Crown and First Nations refer to Aboriginal access and participation in fisheries, and therefore must be considered as part of the legal framework underlying the management of Fraser River sockeye.

Aboriginal and treaty rights are discussed in more detail in Chapter 3, Legal framework.

■ The Commission's process for gathering evidence

In order to develop an evidentiary basis for making the findings of fact and recommendations mandated by the Terms of Reference, this Commission acquired information from a variety of sources.

Interim Report

Taking direction from the Terms of Reference, I published an Interim Report in October 2010, setting out my views on any previous examinations, investigations, or reports deemed relevant to the Inquiry, and on Canada's responses to them. Previous reports were an important source of information. Over the past three decades, there have been dozens of reports on the Pacific fisheries, primarily focusing on DFO's management of the fisheries and its activities respecting harvesting, protection of habitat, protection of wild salmon stocks, and aquaculture. Some, such as Dr. Peter Pearce's 1982 report, were sweeping in nature, examining the condition, management, and utilization of all Pacific coast fisheries. Others, such as the Honourable Bryan Williams's 2005 report, which examined only the 2004 Fraser River sockeye salmon return, focused on a single event.

In my October 2010 Interim Report, entitled *Fraser River Sockeye Salmon: Past Declines. Future Sustainability?*, I discussed 26 of those reports, and summarized the recommendations contained in them and the federal government's initial responses to them. Under the Commission's Terms of Reference, I may consider the findings of these previous reports, as I consider appropriate and relevant, and give them any weight, including accepting them as conclusive.

In my Interim Report, I also discussed the input received by the Commission in response to its June 2010 discussion paper, which outlined the salmon management and technical and scientific issues the Commission intended to investigate, as well as our public forums in 10 coastal and Fraser River communities and our 14 site visits in 12 British Columbia communities. A more detailed description of the Commission's activities before and after the release of the Interim Report can be found in Volume 3, Chapter 5, Commission process.

Public submissions, scientific evidence, and evidentiary hearings

Throughout the Inquiry, members of the public were invited to express their views on issues related to the Commission's mandate by mail, by making a public submission on the Commission's website, or by commenting on another person's

submission. The Commission received approximately 900 submissions, which are referred to throughout this Report.

The Commission undertook a scientific research program, directed by our in-house fisheries research consultant, to investigate possible causes of the decline of Fraser River sockeye. Terms of reference were developed for a series of technical reports, which were contracted out to technical researchers knowledgeable in the respective fields on which they reported. In total, the researchers produced 15 technical reports. Under the Commission's Rules for Procedure and Practice (available on the DVD included with this Report), I may consider these technical reports in making my findings of fact and recommendations. The technical reports are discussed in Volume 2 of this Report; executive summaries are included as Appendix B to Volume 2; and each report is reproduced in full in the DVD accompanying this Report.

In April 2010, I made 21 grants of standing for participation in the Commission. Many of these grants of standing were shared among applicants who originally applied individually. In total, 53 individuals, groups, and organizations were included in these grants of standing.

Between October 2010 and September 2011, I conducted the evidentiary hearings, which were open to the media and public.* Most of the hearings were held at the Federal Court in downtown Vancouver, BC. Hearings were reopened in December 2011 to consider emerging evidence on infectious salmon anemia (ISA) virus. Each witness testified under oath or affirmation, either alone or as a member of a panel.† Each was questioned by Commission counsel and cross-examined by participants or participants' counsel.‡ Witnesses included DFO senior management and employees, officials from the Province of British Columbia and local governments, independent scientists, conservationists, representatives of the aquaculture industry, and representatives of the commercial, sport, and Aboriginal fisheries. The authors of the Commission's technical reports were also questioned and cross-examined on their reports.

The Commission held 133 days of evidentiary hearings, during which 179 witnesses testified, 2,145 documents were filed as exhibits, and 14,166 pages of transcript were generated. Exhibits and transcripts were posted on the Commission's website, giving the media and public full access to our proceedings. All hearing transcripts and the exhibits referred to in this Report are included in the accompanying DVD.

Commission counsel also prepared 21 policy and practice reports on a wide range of legal topics and on numerous salmon management policies and practices.§ These reports were circulated to all participants in advance of evidentiary hearings on the corresponding topics, and were also filed as exhibits. They are part of the DVD included with this Report. Under the Commission's Rules for Procedure and Practice, I may consider these reports and the documents they reference in making my findings of fact and recommendations.

At the conclusion of the evidentiary hearings, I received extensive written and oral final submissions from participants respecting the matters into which I have been directed to inquire, including recommendations for improving the future sustainability of the Fraser River sockeye salmon fishery. In April and May 2012, I invited participants to provide supplementary submissions, if they wished, on how their submissions were affected by proposed changes to a number of pieces of legislation relevant to the work of the Commission contained in Bill C-38 (On June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent.)

All the sources of information and evidence discussed above have formed the basis of this Report, including my findings of fact and recommendations.

Introduction to the Fraser River sockeye fishery

My Terms of Reference direct me to develop recommendations for improving the sustainability

* For a list of general topics covered in the evidentiary hearings, see Volume 3, Appendix F, Hearings.

† For a list of witnesses who testified before the Commission, see Volume 3, Appendix E, Witnesses.

‡ For a list of Commission and participants' counsel, see Volume 3, Appendix G, Hearing counsel.

§ For a list of policy and practice reports, see Appendix E of this volume, List of Policy and Practice Reports.

of the Fraser River sockeye fishery. I interpret this as direction to consider the Fraser River sockeye fishery as a whole. However, this fishery is multifaceted and comprises three distinct harvest sectors: the Aboriginal communal fishery, the general commercial fishery, and the recreational fishery. Here, I provide a brief introduction to each of these harvest sectors; they are discussed in greater detail throughout my Report.

Aboriginal communities have been fishing Fraser River sockeye for all of living memory. While British Columbia is home to a diverse population of Aboriginal cultures, I heard that many groups share a sense of cultural identity deeply rooted in the salmon fishery. This identity includes a profound respect for salmon, which are sometimes viewed as relatives or kin as opposed to simply as fish.⁴ Respect for salmon is passed down from Aboriginal elders to younger generations⁵ and is instilled in the laws of Aboriginal nations.⁶ Several witnesses told me that Aboriginal participation in the Fraser sockeye fishery is a vital means to preserve Aboriginal cultural practices and traditions. For example, Councillor June Quipp of the Cheam Indian Band told me that the salmon fishery is a part of her community's "spirit,"⁷ and Chief Fred Sampson of the Siska Indian Band told me that his community's cultural, physical, and spiritual well-being are all dependent on the salmon fishery.⁸

Aboriginal communal fishing licences authorize fishing for food, social, and ceremonial purposes. In respect of fishing for these purposes, Aboriginal groups enjoy a priority of access to Fraser River sockeye, subject to conservation. In addition, some Aboriginal communal fishing licences may authorize fishing for economic purposes, where fish caught may be sold. DFO's policy is to provide the same priority of access to Aboriginal groups for communal economic fishing as enjoyed by the general commercial fishery.

The decline of Fraser River sockeye has affected Aboriginal communities in several ways. Some witnesses told me that their Aboriginal communities were not harvesting enough salmon to meet basic food needs.⁹ Grand Chief Clarence Pennier of the Stó:lō Tribal Council told me that the loss of sockeye salmon as a food source has forced some members of his community to purchase lower-quality foods.¹⁰ Other witnesses suggested that having less salmon to

eat was contributing to increasing diabetes in their communities.¹¹ The decline of Fraser River sockeye has also meant that some Aboriginal communities have had fewer opportunities to practise their traditional fishing cultures.¹² Chief Sampson told me that without the ability to practise traditional fishing methods, his community has suffered a cultural loss, a language loss, and a loss in transferring knowledge to children.¹³

Recreational fishing, that is, non-commercial fishing to provide food for personal use or as a leisure activity,¹⁴ has been an "icon of west coast lifestyle" for well over a hundred years.¹⁵ It allows Canadians to engage in a social activity that connects them with their natural environment¹⁶ and is recognized by many as an important part of life in this province.¹⁷ Most recreational fishers on the Fraser River are residents of British Columbia: families and friends enjoying time together.¹⁸

The recreational fishery also brings considerable economic benefits to British Columbia. Visitors come from all over the world to participate in the recreational salmon fishery and hundreds of thousands of local residents participate as well.¹⁹ This activity generates thousands of jobs²⁰ (as many as 7,700 jobs in 2005) and contributes hundreds of millions of dollars to British Columbia's gross domestic product (GDP).²¹ Although the recreational fishery is only allocated a small proportion of the total salmon harvest,²² it has contributed as much as 40 percent of the GDP value of all fisheries in British Columbia, including aquaculture.²³ Recreational fishery licences and salmon retention fees also provide the federal government with millions of dollars in revenue each year.²⁴

The decline of Fraser River sockeye has affected the recreational fishery significantly. Salmon fishing has been the "backbone" of the recreational fishery since the late 1800s²⁵ and Fraser River sockeye are particularly important to the in-river fishery.²⁶ In marine areas, the recreational salmon catch dropped in the mid-2000s to less than 10 percent of what it was in the early 1980s.²⁷ In-river recreational salmon fishing is described as a "very sporadic opportunity" with no recreational sockeye catch allowed in 2007 or 2009 and only five days of sockeye harvest allowed in 2008.²⁸ Although higher returns in 2010 allowed for more days of recreational sockeye fishing, uncertainty in sockeye abundance and

years of no recreational allocation affect the predictable and stable fishing opportunities sought by recreational fishers.²⁹

The general commercial fishery has played an important role in the industrial development of British Columbia since Confederation.³⁰ For well over a hundred years, this fishery has provided economic opportunities to a diverse group of Canadians, including those with Aboriginal, European, and Asian ancestry.³¹ Many commercial fishers come from established fishing families that have caught and sold Fraser River sockeye for generations, supporting the economic well-being of their local communities along the way.³² Chief Edwin Newman of the Heiltsuk First Nation told me that participation in the commercial fishery had brought pride and independence to his community.³³

The general commercial fishery has also provided considerable economic benefits to British Columbia, with wild salmon products exported to 63 countries around the world.³⁴ In the mid-1990s, the general commercial fishery landed as much as 42,500 tonnes of salmon valued at \$195.2 million.³⁵ Preliminary estimates of the 2010 season indicate that 31,100 tonnes of wild salmon were harvested for a landed value of \$91.3 million.³⁶ After processing, these values can “almost double.”³⁷ Of all the salmon species,

sockeye is economically the most important owing to its higher market value.³⁸ Over 2,000 commercial salmon licences are issued in the Pacific Region each year, creating thousands of jobs for fish harvesters and processors, many of whom are Aboriginal.³⁹

In recent years, however, the general commercial fishery has suffered from the decline of Fraser River sockeye. In the past decade there have been several years with little or no commercial fishing opportunities for Fraser River sockeye; these include the years 2005, 2007, 2008, and 2009.⁴⁰ As a result, salmon fishers have seen the value of their commercial fishing licences steadily decline over this period,⁴¹ and some fishers dependent on Fraser River sockeye have failed to break even on costs.⁴² This has affected not only individual fishers, but also the many communities that they support, particularly those remote coastal communities that rely on fisheries as a major source of employment and economic well-being.⁴³

I recognize that the Fraser River sockeye fishery is a vital part of British Columbia's identity. Each of the three harvest sectors that comprise this fishery carries important historical, societal, and economic characteristics that I take into account throughout this Report.

Notes

- 1 *Inquiries Act*, RSC 1985, c. I-11.
- 2 *Constitution Act*, 1982, being Schedule B to the *Canada Act* 1982 (UK), 1982, c. 11.
- 3 *R. v. Sparrow*, [1990] 1 SCR 1075, [1990] SCJ No 49.
- 4 Exhibit 279, p. 4; Exhibit 278, p. 4; Fred Sampson, Transcript, December 14, 2010, pp. 7–8.
- 5 Exhibit 294, pp. 2–3.
- 6 For example, in Haida laws: Exhibit 299, pp. 2–3.
- 7 Exhibit 278, p. 3.
- 8 Exhibit 291, p. 2.
- 9 Exhibit 291, p. 2; Exhibit 292, p. 2.
- 10 Transcript, December 13, 2010, p. 20.
- 11 Exhibit 301, p. 3; Exhibit 292, p. 3.
- 12 Saul Terry, Transcript, December 14, 2010, p. 18; Exhibit 293, p. 2.
- 13 Transcript, December 14, 2010, p. 10.
- 14 Exhibit 946, p. 24.
- 15 Exhibit 527, p. 3.
- 16 Exhibit 527, p. 3.
- 17 Exhibit 527, p. 11.
- 18 Devona Adams, Transcript, March 2, 2011, p. 7.
- 19 PPR 7, pp. 3, 14; Exhibit 527, p. 11.
- 20 Exhibit 548, p. 21; Exhibit 946, p. 24.
- 21 Exhibit 946, p. 24.
- 22 Exhibit 264, p. 25.

- 23 Exhibit 548, p. 1; Exhibit 946, p. 24.
- 24 PPR 7, p. 14; Exhibit 548, p. 20.
- 25 Devona Adams, Transcript, March 2, 2011, p. 5.
- 26 Debra Sneddon, Transcript, March 2, 2011, p. 8.
- 27 Exhibit 548, p. 22.
- 28 Debra Sneddon, Transcript, March 2, 2011, p. 8.
- 29 Debra Sneddon, Transcript, March 2, 2011, p. 8.
- 30 Exhibit 1135, p. 10.
- 31 Exhibit 1135, p. 14.
- 32 Russ Jones, Transcript, June 30, 2011, pp. 26–27; Rod Naknakim, Transcript, December 15, 2010, p. 7.
- 33 Exhibit 300, p. 2; Edwin Newman, Transcript, December 15, 2010, p. 30.
- 34 Exhibit 946, p. 28.
- 35 Exhibit 508.
- 36 Exhibit 508.
- 37 Rob Morley, Transcript, March 1, 2011, p. 84.
- 38 Exhibit 946, p. 26; Exhibit 507, pp. 4, 7.
- 39 Exhibit 1978; Exhibit 946, p. 28.
- 40 PPR 18, pp. 44–45.
- 41 Exhibit 946, p. 28.
- 42 Exhibit 946, p. 28.
- 43 Exhibit 577, p. 4.

Chapter 2 • The life cycle of Fraser River sockeye salmon

■ Introduction

In this chapter, I summarize the extraordinary life cycle of the Fraser River sockeye salmon to provide the reader with some context for my later discussion of fisheries management issues and possible causes of the recent decline. I have drawn from several sources, including both the concise summary of the life cycle in the Commission's Technical Report 4, *Marine Ecology*,¹ and the testimony of three witnesses: Michael Lapointe (chief biologist with the Pacific Salmon Commission), Dr. David Welch (president of Kintama Research Services Ltd.), and Karl English (senior fisheries scientist with LGL Limited environmental research associates).*

From the headwaters in the Rocky Mountains, the Fraser River follows the Rocky Mountain

Trench to the Interior Plateau. It continues south to the Coast Mountains and drains from a broad flood plain into the Strait of Georgia. Within the Fraser River watershed there are hundreds of tributaries, streams, marshes, bogs, swamps, sloughs, and lakes. The river is 1,600 km long, with a watershed size of 223,000 km² and a lake nursery area of 2,500 km².

The Fraser River supports the largest abundance of sockeye salmon in the world for a single river. More than 50 percent of all salmon production in British Columbia occurs in the Fraser River watershed.²

Figure 1.2.1 provides a month-by-month timeline of the Fraser River sockeye salmon life cycle.

* See also Exhibits 1, 2, and 3, respectively, for slide presentations prepared by the three witnesses.

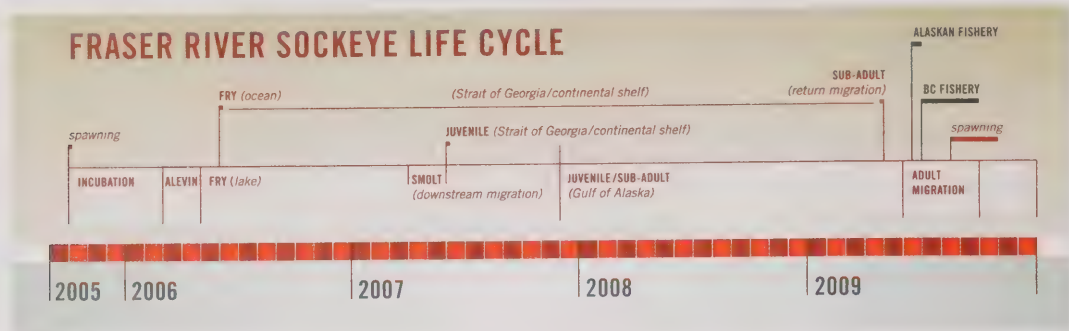


Figure 1.2.1 Fraser River sockeye salmon life cycle

Note: This figure reflects an average four-year life cycle. Variations will be found within each stock; however, some fish return at three years of age and others at five years of age. In addition, this figure does not reflect the unique life cycle of the Harrison River stock.

Source: Cohen Commission of Inquiry.

A typical life cycle

Fraser River sockeye salmon generally have a four-year lifespan. The following examination considers 2009 spawners as an example. Their life began in the fall of 2005, when their parents returned to their natal streams throughout the Fraser River watershed to spawn.

Spawning

During the spawning process, the female is the dominant partner and interacts with both the gravel environment and the courting male in a specific sequence of activities. The activities include nest site selection, nest construction, courtship display, release of eggs, fertilization, covering of the nest, and defending against intruders. The female selects a site for the deposit of her eggs (“redd”); digs a depression (“nest”) in the gravel substrate; and deposits 500 to 1,100 eggs, which are simultaneously fertilized by an accompanying male or males. She then covers the eggs by further digging and repeats the digging and spawning process up to several times. Finally she covers the completed redd, which may contain several nests of eggs, and then guards the site until near death. A few days after she has completed spawning, she dies. Her body floats away with the current or sinks to the bottom, creating room on

the spawning grounds for the next wave of ripe females to occupy nesting territories. The whole spawning process, from moving onto the spawning grounds to death, lasts about 10 days. Each spawning female lays between 3,000 and 4,000 eggs in the gravel, the number of eggs depending on the female’s body size. Fish spawning in fine substrate tend to produce smaller eggs than fish spawning in very coarse substrate.

Eggs

During the winter, salmon eggs develop in the gravel, where they are protected from floods, ice conditions, and predators. The rate of egg development during incubation depends on water temperature and genetic characteristics related to environmental conditions of the specific population. Embryonic development is faster as the temperature increases; a small difference in average incubation temperature can change emergence timing by four weeks.³

Alevins

In the early spring, after about five months’ incubation, alevins emerge from the eggs. A pronounced yolk sac suspended below the body provides nourishment for six to 10 weeks, depending on water temperature. During this period, the alevins

remain in the gravel for protection from predators and because they are poor swimmers.

Mr. Lapointe explained that there are several sources of egg and alevin mortality, including predation by birds and fish, being dug up by later-spawning females, desiccation (dehydration) and freezing resulting from low water levels, physical disturbance (e.g., scouring of nesting areas because of high water flows), suffocation caused by fine sediment or low oxygen, and diseases and parasites.⁴

Fry

In about May 2006, approximately eight months after spawning, the yolk sac is absorbed into the body cavity, and the alevins become fry. The fry, now typically about 3 cm long, migrate downstream (or, more rarely, upstream) into a nursery lake in search of food. The distribution of Fraser River sockeye salmon nursery lakes is shown in Figure 1.2.2.

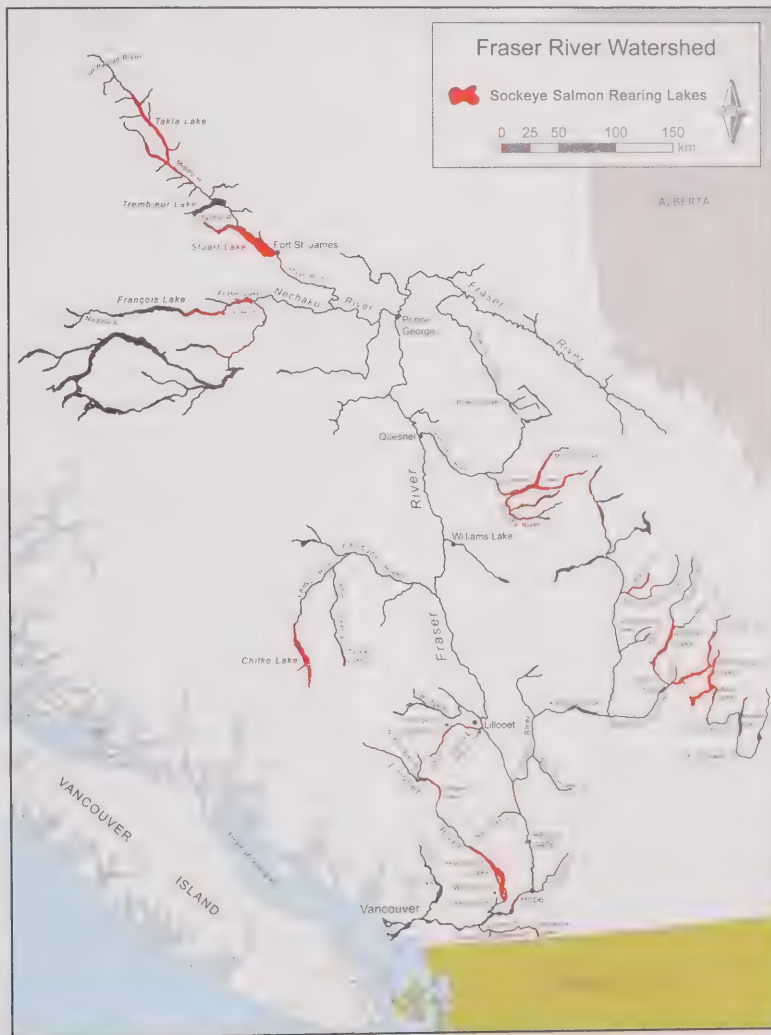


Figure 1.2.2 Fraser River sockeye salmon-rearing lakes

Source: Technical Report 4, Marine Ecology, p. 7 (reproduced from Exhibit 1291).

Mr. Lapointe testified that eight of these sockeye nursery lakes account for 80 percent of the juvenile-rearing capacity in the Fraser River watershed.⁵ These nursery lakes are, in decreasing order of surface area, Stuart, Shuswap, Quesnel, François, Takla, Harrison, Chilko, and Adams lakes.⁶

The migration into these nursery lakes ranges between a few hundred metres and more than 100 km. The fry typically live in the lake for one year (May 2006–May 2007) or in some cases two years, feeding on zooplankton such as *Daphnia*. They tend to remain near the surface at dawn and dusk while feeding, and during the bright daylight hours they migrate deeper to avoid predators.

Mr. Lapointe said that the principal sources of mortality for fry are lack of food, predation, diseases, and environmental stressors such as water temperature.⁷

Smolts

By approximately May 2007, about 20 months after spawning, when the fry are about 8 cm long, they begin a process called “smoltification,” a physiological change required for the transition from life in freshwater to life in seawater. They cease their movement between shallower and deeper parts of the lake; begin to gather into schools of fish; develop an ability called “compass orientation,” which aids their navigation out of the lake and downstream; and take on a silvery body colouration.

The downstream migration to the ocean ranges widely, from 40 km for the Widgeon Slough population to 1,200 km for the Early Stuart population. One of the largest populations, resident in Chilko Lake, will reach the Strait of Georgia in about eight days. During this downstream migration, predation is a major source of smolt mortality.

Fraser River sockeye river-type populations, such as the Harrison River population, do not spend a year in a nursery lake and have a different outmigration pattern. They migrate downstream almost immediately after emerging from the gravel and, after spending a few months in sloughs and estuaries, enter the Strait of Georgia before they are one-year-old (2006).

Migration through the Strait of Georgia

After leaving the river, it is believed that most Fraser River sockeye juveniles turn north and migrate through the Strait of Georgia, Johnstone Strait, and Queen Charlotte Strait and into Queen Charlotte Sound. Dr. Welch said that, by late 2007, Fraser River sockeye were present throughout the northern British Columbia coast, the Alaska Panhandle, and the Alaska Peninsula.⁸

There is some evidence that the Harrison River population, and perhaps other populations, is an exception to this migratory pattern. For example, it appears that the Harrison River population spends the remainder of its outward migration year (2006) in the Strait of Georgia and then migrates south of Vancouver Island through Juan de Fuca Strait to the west coast of Vancouver Island.⁹

Continental shelf and Gulf of Alaska

On leaving the Strait of Georgia, juvenile sockeye (also called “postsmolts”) continue their migration through Johnstone and Queen Charlotte straits toward the North Pacific Ocean, where they enter south of Haida Gwaii (Queen Charlotte Islands). On entering the North Pacific Ocean, there is some evidence that the postsmolts migrate north and westward within 35 km of the coasts of British Columbia and central Alaska until they reach the overwintering grounds south of Alaska during late autumn and early December. Figure 1.2.3 depicts the postsmolt migration along the continental shelf.

The distribution and movement of immature Fraser River sockeye salmon at sea is the least understood of the fish’s life history phases. Dr. Welch testified that his recent research suggests postsmolts are staying resident on the continental shelf, as far west as the beginning of the Aleutian Islands, for many months. In his testimony, Dr. Welch commented on earlier studies:

There was a conjectural model that was developed by French and colleagues some 40 years ago now on what the movements of sockeye were. This is ... where science ... meets art. It was the best guess that the biologists at the time could identify with

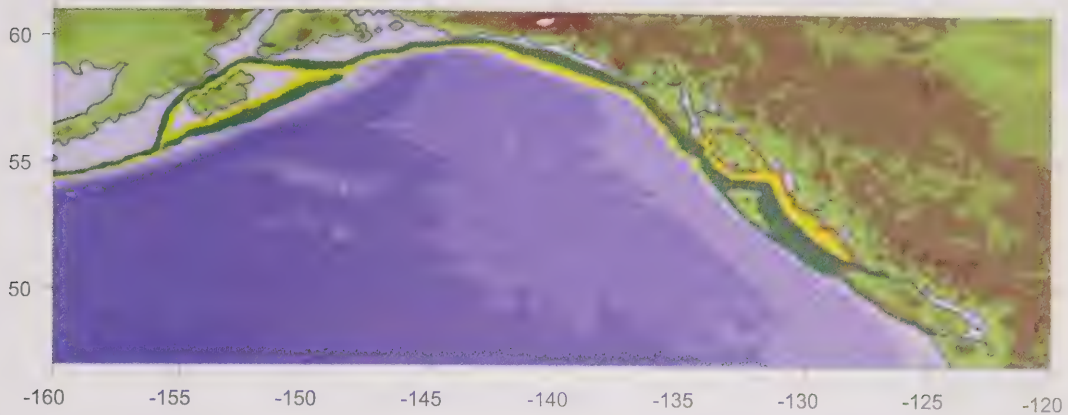


Figure 1.2.3 Seasonal migration of Fraser River sockeye salmon postsmolts after leaving the Strait of Georgia

Notes: Blue, May-June; green, July-August; yellow, October-November; orange, February-March.

Source: Technical Report 4, Marine Ecology, p. 17 (Exhibit 1291).

the technologies at their hands and the data that they'd collected, and it shows a pattern of movement back and forth which Mike Lapointe has already indicated to you. My personal view on this is that it's simply the best guess we can make, but it's a lovely work of fiction that fits the very thin amounts of data that we have, but I don't think that it's necessarily appropriate or correct for Fraser River sockeye or possibly for any species of – any stock of sockeye salmon. I think they're doing something much more sophisticated than this, but the data is too simplistic to really tell you what Fraser River sockeye are doing.¹⁰

Stock-specific movements of Fraser River sockeye in the open ocean are unclear, but there is some evidence that, offshore, different sockeye stocks appear in different locations. Dr. Welch indicated that sockeye from the Nass, Skeena, Fraser, and Columbia rivers and from Rivers Inlet were spatially separated during the month of June.

Dr. Welch also testified that when sockeye salmon are small they eat plankton, but as they grow larger they eat other fish and squid. He referred to a 1992 study which showed that the abundance of both Gulf of Alaska plankton and pelagic fish and squid doubled in the 1980s (over the 1950s and 1960s), a period also marked by rapid increases in Fraser River sockeye.

Returning to the Fraser River

In their fourth (or, in some cases, fifth) year of life (2009), and after spending two (in some cases, three) years in the Gulf of Alaska, Fraser River sockeye leave the Gulf of Alaska and return to the Fraser River to spawn. Fraser River sockeye are captured in fisheries between Alaska and Washington State; their availability depends on their migration route. There are two migratory return routes – through Johnstone Strait and the Strait of Georgia (the northern diversion route), or down the west coast of Vancouver Island and through Juan de Fuca Strait. The percentage of sockeye salmon that follow the northern diversion route varies from year to year. Dr. Welch referred to a study showing that, when the ocean temperature is 10°C, the migration is almost entirely through Juan de Fuca Strait; but when the temperature increases to 12–13°C, 80–90 percent of returning sockeye come through the northern diversion route.¹¹

Mr. English explained that, when returning Fraser River sockeye approach the coast in Alaska as opposed to farther south, a larger portion of the run tends to migrate through Johnstone Strait. This pattern is common for sockeye returning after mid-August and is particularly common in strong El Niño years, when there are warmer waters

farther north in the Pacific Ocean. In contrast, when Fraser River sockeye approach the coast in southern British Columbia – especially sockeye returning in June, July, and early August – a larger portion of the run tends to migrate through Juan de Fuca Strait.

Fraser River sockeye coming south along the west coast of Vancouver Island continue to feed, and there is some evidence that salmon migrating south through the Strait of Georgia do so as well. However, once they begin their upstream migration, their digestive tract shuts down. Dr. Welch described the transformation that occurs:

Sockeye store fat as oil in the muscles and as they migrate up the river, for example, they burn that oil or fat to fuel the migration and they replace it with water. So as they progress up the river, their shape doesn't change, but they replace fat, which is energy-rich, with water and they become softer.¹²

Timing of entry into the Fraser River

As returning Fraser River sockeye approach the mouth of the Fraser River, either through Juan de Fuca Strait or through Johnstone Strait, there is some variation respecting how promptly they move into the river and begin their upstream migration.

This variation is based on the four run-timing groups – Early Stuart, Early Summer, Summer, and Late-run. The Early Stuarts (which return in June and July) and the Early Summers and Summers (which return in July and August) enter the Fraser River with little or no delay – perhaps within one day. Thus, sockeye passing through Johnstone Strait need six or seven days to move through the Strait of Georgia, enter the river, and reach Mission. Fish returning through Juan de Fuca Strait need five or six days to reach Mission.

However, the Late-run timing group (which has historically returned in August–September) exhibits two distinctive types of behaviour. Since the 1990s, some parts of the run will enter the river with little or no delay, at the same time as the Summer timing group. The others, as Late-runs

have always done, will delay their entry at the mouth of the Fraser River for 20–30 days, or longer in some years.

Factors that influence river-entry timing include fish maturity, tides, river flow, and water temperature. Over time, an increasing overlap of the different run-timing groups has been observed. Mr. English described the increasingly early appearance of the Late-run timing group at Mission from late August during the 1990s to late July in the 2000s.

River migration

Through the use of radio transmitters in fish and at monitoring locations along the Fraser River, it is possible to measure how quickly returning salmon move upriver and to assess their passage through challenging areas such as Hell's Gate canyon and the Bridge River rapids. Early Stuarts move the fastest – one fish, tagged at Mission, swam 800 km to the Stuart system in 16 days, averaging 45–50 km per day. A Summer-run sockeye, moving more slowly, took 24 days of freshwater migration to reach the Chilko system. During 2009, migration speeds of Summer-run sockeye ranged between 32 and 40 km per day.¹³

Water temperature plays an important role in survival. In the ocean, sockeye prefer temperatures of 12–14°C, or even cooler. However, as the fish migrate upstream, river water temperature is frequently between 18 and 20°C. There is some evidence that sockeye will interrupt their migration by remaining in cooler lakes for a week or longer to bring their temperature back down before pressing upstream to their spawning area. Research undertaken between 2002 and 2006 showed that Late-run sockeye entering the river before mid-August experienced a very low probability of survival, while those beginning their upstream migration in mid- to late September were far more likely to reach the spawning ground and actually spawn.¹⁴

Mr. Lapointe testified that Environment Canada records show that increasing water temperature in the Fraser River is a significant environmental change – eight of the 10 warmest summer river temperatures on record have occurred in the 15 years from 1996 to 2011.¹⁵

Life cycle survival

Significant mortality occurs throughout the various stages of the Fraser River sockeye life cycle. Based on Mr. Lapointe's materials, I understand the mortality to be approximately as follows, although there clearly are variations among the different populations.

Eggs per female	3,000
Egg-to-fry mortality rate (86 percent)	-2580
Survivors to fry stage	420
Fry-to-smolt mortality rate (71 percent)	-298
Survivors to smolt stage	122
Smolt-to-adult mortality rate (91 percent)	-110
Survivors to adult stage	12
Fishery harvest rate (70 percent)	-8
Fish remaining for spawning	4

The same information can be presented graphically, as set out in Figure 1.2.4.

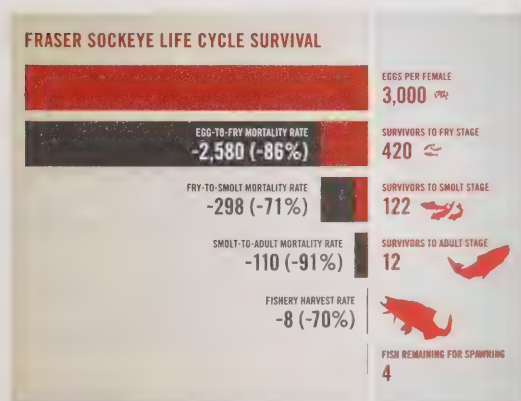


Figure 1.2.4 Fraser River sockeye salmon life cycle survival

Source: Compiled using data from Exhibit 1, slide 21.

Fraser River sockeye salmon migration – an enduring puzzle

In Technical Report 4, Marine Ecology, the authors divided the Fraser River sockeye salmon

life cycle into 12 sequential habitats, represented in Figure 1.2.5.

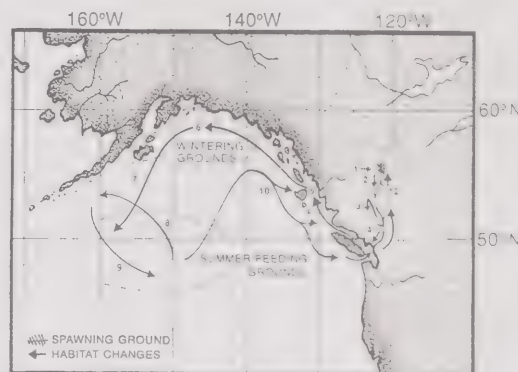


Figure 1.2.5 Habitats occupied by a typical Fraser River sockeye salmon

Source: Technical Report 4, Marine Ecology, p. 10 (Exhibit 1291).

The authors described each habitat as a bead in a chain linked by migrations. It is important that each habitat is in prime condition, and that migration routes between habitats are not hindered, blocked, or made unsuitable, because any weak or broken link will significantly affect production and survival. The authors added:

The long distance migrations of sockeye salmon from habitat to habitat provide some of the most enduring puzzles in salmon ecology. The migrations are well timed and well directed and can vary from a few hundred metres to thousands of kilometres. To perform these feats, sockeye salmon possess a remarkable set of direction-finding mechanisms that include sun compass and magnetic compass orientation. They are also able to distinguish water masses, such as between their natal tributary and nearby tributaries, and differences between stocks on the basis of odour.

Sockeye salmon are also able to migrate to a goal, such as the estuary of their natal stream, from any area in the North Pacific Ocean. This goal-finding ability is evident in the high rate of homing (greater than 95 percent) to their ancestral spawning grounds. To quote Ferris Neave, a fisheries biologist who worked at the

Pacific Biological Station for many years, "It is difficult to avoid the conclusion that throughout the period of ocean life some awareness

of position in relation to the place of origin is maintained". The mechanisms underlying this capability are not well known.¹⁶

Notes

- 1 Exhibit 1291.
- 2 Exhibit 1915, p. 6.
- 3 Michael Lapointe, Transcript, October 25, 2010, p. 17.
- 4 Transcript, October 25, 2010, p. 18; Exhibit 1, p. 11.
- 5 Transcript, October 25, 2010, p. 29.
- 6 Exhibit 1, p. 37.
- 7 Transcript, October 25, 2010, p. 20.
- 8 Transcript, October 25, 2010, p. 35.

- 9 Exhibit 2.
- 10 Transcript, October 25, 2010, pp. 40-41.
- 11 Transcript, October 25, 2010, p. 42.
- 12 Transcript, October 25, 2010, p. 93.
- 13 Karl English, Transcript, October 25, 2010, p. 57.
- 14 Karl English, Transcript, October 25, 2010, pp. 59-61.
- 15 Transcript, October 25, 2010, p. 94.
- 16 Exhibit 1291, p. 10.

Chapter 3 • Legal framework

The Fraser River sockeye salmon fishery operates in a complex legal environment. This chapter provides an overview of that legal framework. The overview is based on legislation and case authority, the policy and practice reports filed with the Commission,¹ and participants' submissions on the content of these policy and practice reports.

■ Canadian constitutional law and principles

The statutory and regulatory framework governing the fishery derives its authority from the Canadian Constitution. Sections 91 and 92 of the *Constitution Act, 1867*, set out the legislative competence of the federal parliament and provincial legislatures.² In some cases, there is overlap between federal and provincial jurisdiction. The specific areas of overlap that relate to the Fraser River sockeye salmon fishery are discussed in this chapter, as well as in chapters on specific topics.

Federal jurisdiction over the fisheries – *Constitution Act, 1867*

The *Constitution Act, 1867*, divides the subject areas over which the federal and provincial governments have control. Under subsection 91(12), Parliament has exclusive legislative authority for all matters in relation to "Sea Coast and Inland Fisheries," which encompasses the obligation to manage the country's fisheries. Under subsection 92(13), the Province of British Columbia has exclusive legislative authority over "property and civil rights in the province." When the colony of British Columbia joined Confederation in 1871, it ceded jurisdiction³ over its fisheries to Canada.³ This grant of exclusive federal legislative jurisdiction over seacoast and inland fisheries did not convey to Canada any proprietary right to those fisheries, which were and remain a "common property resource belonging to all the people of Canada."⁴ Federal regulation of fisheries began in 1868 with the enactment of the first *Fisheries Act* (now RSC 1985, c. F-14). Property

rights in the fishery that were previously vested in private individuals or the provinces were not altered by the *Constitution Act, 1867*.⁵ The federal power over fisheries is not confined to the conservation of fish stocks, but extends more broadly to the maintenance and preservation of the fishery as a whole, including its economic value.⁶

The federal government also has jurisdiction over some matters associated with marine pollution and protection of the environment, although the regulation of matters relating to protection of the environment includes several areas that are within the jurisdiction of the provinces. This overlap is discussed in more detail below.

Ultimate authority of the minister

In decisions arising in the Aboriginal rights context, the Supreme Court of Canada has found that, if the fishery is to survive, it must be managed by the federal government as a central authority:

If the salmon fishery is to survive, there must be some control exercised by a central authority. It is the federal government which will be required to manage the fishery and see to the improvement and the increase of the stock of that fishery. It is for the federal government to ensure that all users who are entitled to partake of the salmon harvest have the opportunity to obtain an allotment pursuant to the scheme of priorities set out in *Sparrow*.⁷

The Supreme Court of Canada has stated that the responsibility for conservation of the fisheries resource is placed squarely on the minister and not on Aboriginal or non-Aboriginal users of the resource.⁸ The courts have yet to recognize an Aboriginal right to manage the Fraser River sockeye salmon fishery.

Even where Aboriginal rights in the fishery are found to exist and the government is required to ensure that its management plans give full effect to those rights, “the constitutional entitlement embodied in s.35(1) [recognizing existing Aboriginal and treaty rights] ... is not to undermine Parliament’s ability and responsibility with respect to creating and administering overall conservation and management plans regarding the fishery.”⁹ The government is also required to make decisions that affect harvest allocations and fishery access

between Aboriginal peoples and non-Aboriginal peoples, and among different groups of Aboriginal peoples who hold different rights in the fishery.¹⁰ (Aboriginal rights are discussed further below.)

Conservation mandate of the Department of Fisheries and Oceans

The Supreme Court of Canada recognized the broad legislative jurisdiction of the federal government in the conservation and maintenance of the fisheries as early as 1882. In *The Queen v. Robertson*, the Supreme Court of Canada interpreted the federal power to legislate pursuant to subsection 91(12) of the *Constitution Act* as extending “to subjects affecting the fisheries generally, tending to their regulation, protection and preservation.”¹¹ In *Interprovincial Co-Operatives Ltd. v. The Queen*, Chief Justice Laskin wrote that the federal fisheries power “is concerned with the protection and preservation of fisheries as a public resource.”¹²

In *Ward v. Canada (Attorney-General)*, the Supreme Court of Canada considered a number of authorities on the extent of the federal government’s power to regulate the sale of fish and concluded that “[t]he rationale [of any federal power to regulate sale of fish] is that the federal government may limit sales in order to prevent injurious exploitation of the resource.”¹³ The Court also concluded that “[m]easures that in pith and substance ... go to the maintenance and preservation of the fisheries fall under federal power.”¹⁴

The federal government has legislated extensively in respect of its mandate for the conservation and maintenance of fisheries. The primary legislative exercise of the federal conservation mandate is subsection 43(b) of the *Fisheries Act*, which provides the power to the Department of Fisheries and Oceans (DFO) to make regulations “respecting the conservation and protection of fish.” The *Oceans Act* and many of the other statutes discussed in this chapter and elsewhere in this Report flow from the federal power over conservation and maintenance of the fishery. DFO has regulated extensively pursuant to subsection 43(b).

In the 1980 decision in *Jack v. The Queen*, a case which precedes the enactment of section 35 of the *Constitution Act, 1982*, Justice Dickson set out the primary importance of conservation in the management of fisheries:

Conservation is a valid legislative concern. The appellants concede as much. Their concern is in the allocation of the resource after reasonable and necessary conservation measures have been recognized and given effect to. They do not claim the right to pursue the last living salmon until it is caught. Their position, as I understand it, is one which would give effect to an order of priorities of this nature: (i) conservation; (ii) Indian fishing; (iii) non-Indian commercial fishing; or (iv) non-Indian sports fishing; the burden of conservation measures should not fall primarily upon the Indian fishery.

I agree with the general tenor of this argument ... With respect to whatever salmon are to be caught, then priority ought to be given to the Indian fishermen, subject to the practical difficulties occasioned by international waters and the movement of the fish themselves. But any limitation upon Indian fishing that is established for a valid conservation purpose overrides the protection afforded the Indian fishery by art. 13, just as such conservation measures override other taking of fish.¹⁵

In its 1990 decision in *R. v. Sparrow*, the Supreme Court of Canada followed the above passage from *Jack* in determining that conservation takes precedence over the food, social, and ceremonial (FSC) fishery as follows:

The constitutional nature of the Musqueam food fishing rights means that any allocation of priorities after valid conservation measures have been implemented must give top priority to Indian food fishing. If the objective pertained to conservation, the conservation plan would be scrutinized to assess priorities. While the detailed allocation of maritime resources is a task that must be left to those having expertise in the area, the Indians' food requirements must be met first when that allocation is established.¹⁶

Subsequent to *Sparrow*, several DFO policies set out that conservation is the department's primary mandate. (See discussion in Chapter 4, DFO overview.)

Aboriginal and treaty rights

Legal historical context: regulation of Aboriginal fishing to 1982

In recognizing the current legal framework for Aboriginal fishing, several participants suggested that I consider the historical regulation of Aboriginal participation in the fishery. Dr. Douglas Harris, professor of law, University of British Columbia, prepared a report for the Commission entitled "The Recognition and Regulation of Aboriginal Fraser River Sockeye Salmon Fisheries to 1982."¹⁷ I qualified Dr. Harris as an expert in the legal history of Aboriginal fisheries in British Columbia.¹⁸ His report covered three main topics: the development of Canadian laws, regulations, and jurisprudence related to Aboriginal participation in the Fraser River sockeye fishery; the development of historical treaties in British Columbia; and the practice of coastal reserve allotments or reserve allotments adjacent to the Fraser River or its tributaries.¹⁹

Dr. Harris described the development of laws, regulations, and licensing policies on the participation of Aboriginal peoples in the industrial fishery, as well as on the regulation of a food fishery. Aboriginal fishers "were a crucially important part of the labour force in the early industrial fishery."²⁰ However, their participation was reduced in absolute numbers following the introduction of limited commercial licences in the late 1880s and proportionally by the increased involvement of non-Aboriginal fishers through the early 1900s.²¹ The creation of a separate Aboriginal food fishery under the *Fisheries Act* also affected Aboriginal fishing.²² Dr. Harris describes the food fishery as a "legal construct" created in the late 19th century and continuing through to the present.²³

Regarding the development of historical treaties, Dr. Harris described the 14 agreements entered into between the Hudson's Bay Company (on behalf of the British Crown) and Aboriginal groups on Vancouver Island.²⁴ These agreements are better known as the "Douglas Treaties," after Governor James Douglas, the Hudson's Bay Company's chief trader and governor of the colony of Vancouver Island.²⁵ The Douglas Treaties contain the following clause: "It is also understood that we are at liberty to hunt over the unoccupied lands, and to carry on our fisheries as formerly."²⁶ While this

provision relates to a treaty right in relation to the fishery, Dr. Harris agreed that such right has “not been definitively interpreted in a Canadian court.”²⁷ Although Dr. Harris’s personal view is that the provision is to be broadly construed as a recognition of existing rights, he agreed that this is “an unresolved area” with “differing perspectives.”²⁸

Regarding the creation of coastal reserve allotments or reserve allotments adjacent to the Fraser River or its tributaries, Dr. Harris wrote that the process of allotting Indian reserves began under the Douglas Treaties, continued sporadically through the colonial era, and recommenced with the formation of the Joint Indian Reserve Commission in 1876.²⁹ The Joint Indian Reserve Commission allotted more than 1,500 reserves throughout British Columbia, which, in total, amount to slightly more than one-third of 1 percent of the provincial land area.³⁰ Dr. Harris said that most of these reserves are connected to salmon fisheries and the best way to understand British Columbia’s reserve geography is “that these reserves were really securing access to the fishery.”³¹ Several Aboriginal participants adopted this view and suggested to me that Governor Douglas and other reserve commissioners intended in these reserve allotments to recognize Aboriginal rights to fish.³² Although I make no determination on rights, I note that in the recent *Lax Kw’alaams Indian Band v. Canada (Attorney General)* decision, the Supreme Court of Canada upheld a trial court’s finding that, on the facts of that case, “the Crown ... never intended in the process of allocating reserves to grant ... preferential access to the fishery.”³³

Recognition of Aboriginal and treaty rights: Constitution Act, 1982

Section 35(1) of the *Constitution Act, 1982*, provides that “[t]he existing aboriginal and treaty rights of the aboriginal peoples of Canada are hereby recognized and affirmed.”³⁴ As the first inhabitants of North America, the Aboriginal peoples of Canada are accorded special legal and constitutional protections.* Chief Justice Lamer explained this in *R. v. Van der Peet* in 1996:

In my view, the doctrine of aboriginal rights exists, and is recognized and affirmed by s. 35(1),

because of one simple fact: when Europeans arrived in North America, aboriginal peoples *were already here*, living in communities on the land, and participating in distinctive cultures, as they had done for centuries. It is this fact, and this fact above all others, which separates aboriginal peoples from all other minority groups in Canadian society and which mandates their special legal, and now constitutional, status.³⁵ [Emphasis in the original.]

The recognition and affirmation of Aboriginal and treaty rights serves to ensure the continued existence of distinctive Aboriginal societies and to provide them with “cultural security and continuity.”³⁶ As such, Aboriginal rights will vary among Aboriginal societies “in accordance with the variety of aboriginal cultures and traditions which exist in this country.”³⁷ The same Aboriginal rights are not held uniformly by all Aboriginal peoples in Canada.

In *Van der Peet*, the Supreme Court of Canada set out the test for identifying an Aboriginal right protected by section 35 of the *Constitution Act, 1982*:

[I]n order to be an aboriginal right, an activity must be an element of a practice, custom or tradition integral to the distinctive culture of the aboriginal group claiming the right.³⁸

The existence and scope of Aboriginal rights must be determined after a full hearing that is fair to all stakeholders and requires consideration of each of the components of the *Van der Peet* test.³⁹

A practice, custom, or tradition: Aboriginal rights are founded on practices, customs, or traditions, rather than common law property concepts or the importance of a resource to an Aboriginal group.⁴⁰ As explained in *R. v. Sappier* and *R. v. Gray*, the right to fish may protect a traditional means of sustenance or a pre-contact practice that was relied on for survival, but “there is no such thing as an aboriginal right to sustenance” or a right to the fish themselves.⁴¹ In addition, the right to fish is a site-specific right limited to identifiable geographic areas, rather than an abstract right exercisable anywhere.⁴²

* Section 35(2) of the *Constitution Act, 1982*, defines the “aboriginal peoples of Canada” as including the Indian, Inuit, and Métis peoples of Canada.

Integral to: In *Van der Peet*, the Court suggested that in order to be “integral,” a practice, custom, or tradition must be “a central and significant part of the society’s distinctive culture.”⁴³ This does not require that the practice on which an Aboriginal right is based go to the “core” of a society’s identity or be its single most important defining characteristic.⁴⁴ However, it must be “independently significant” and must not “exist simply as an incident to another practice, custom or tradition.”⁴⁵

Distinctive culture: What constitutes an Aboriginal group’s culture is determined taking into account the perspective of the Aboriginal peoples themselves and the relationship of Aboriginal peoples to the land.⁴⁶ This determination requires an inquiry into the “way of life of a particular aboriginal community, including their means of survival, their socialization methods, their legal systems, and, potentially, their trading habits.”⁴⁷ The qualifier “distinctive” is added to incorporate an element of “aboriginal specificity” but is not meant to reduce aboriginality to “racialized stereotypes of aboriginal peoples.”⁴⁸ Also, distinctive does not mean “distinct” as more than one Aboriginal group may hold the same Aboriginal right.⁴⁹

Group claiming the right: Aboriginal rights are held communally by an Aboriginal people rather than by an Aboriginal person. Section 35 recognizes and affirms Aboriginal rights in order to ensure the continued existence of Aboriginal societies.⁵⁰ Therefore, the right to harvest a resource cannot be held independently of the Aboriginal society that the right is meant to protect.⁵¹

Aboriginal and treaty rights do not exist in a vacuum. The Supreme Court of Canada explained that “distinctive aboriginal societies exist within, and are a part of, a broader social, political and economic community, over which the Crown is sovereign.”⁵² The constitutional entrenchment of Aboriginal rights provides a framework for the protection of distinctive Aboriginal societies, so that their prior occupation can be reconciled with the sovereignty of the Crown.⁵³ In *Mitchell v. M.N.R.*, Justice Binnie said that “[t]he constitutional objective is reconciliation not mutual isolation.”⁵⁴ Similarly, he explained in *Mikisew Cree First Nation v. Canada* that “[t]he fundamental objective of

the modern law of aboriginal and treaty rights is the reconciliation of aboriginal peoples and non-aboriginal peoples and their respective claims, interests and ambitions.”⁵⁵

Right to fish for food, social, and ceremonial purposes

In *R. v. Sparrow* in 1990, the Supreme Court of Canada recognized for the first time an Aboriginal right to fish for food, social, and ceremonial (FSC) purposes:

[F]or the Musqueam, the salmon fishery has always constituted an integral part of their distinctive culture. Its significant role involved not only consumption for subsistence purposes, but also consumption of salmon on ceremonial and social occasions. The Musqueam have always fished, for reasons connected to their cultural and physical survival.⁵⁶



Drying sockeye, Lillooet, BC, 2010

As described above, the right to fish for FSC purposes carries with it a priority of allocation

to the fishery, subject only to conservation.⁵⁷ As guidance, the Court offered an operational description of this priority, suggesting that in years of low abundance it may be possible for all fish caught to be allocated for FSC purposes; the brunt of conservation measures are to be borne by the commercial and recreational fisheries.⁵⁸ However, the priority of FSC allocation is not without limits. It is “not to undermine Parliament’s ability and responsibility with respect to creating and administering overall conservation and management plans regarding the salmon fishery.”⁵⁹ Moreover, in *R. v. Quipp*, the BC Court of Appeal clarified that the priority of FSC fisheries does not require that they precede or occur contemporaneously with commercial and recreational fisheries.⁶⁰

The Supreme Court of Canada also articulated the importance of understanding Aboriginal rights in a manner that is informed by, and sensitive to, the perspectives of the Aboriginal group claiming the right.⁶¹ Aboriginal groups participating in this Inquiry have expressed their understanding of the right to fish as a broad right, which in their perspective includes the following: a responsibility to protect, conserve, and sustain the fishery; a responsibility to other Aboriginal peoples dependent on salmon; a right to fish for all purposes; a right to use all traditional and modern fishing methods; and a right and responsibility to maintain proper relations to the salmon and their ecology.⁶²

Right to fish for economic purposes

As with other Aboriginal rights, the right to fish for economic purposes is determined according to the framework set out in *Van der Peet*, and depends on the particular practices, customs, and traditions of the Aboriginal group claiming the right. In *R. v. Gladstone*, the Supreme Court of Canada determined that the Heiltsuk people hold an Aboriginal right both to exchange herring spawn-on-kelp for money or other goods and to trade herring spawn-on-kelp on a commercial basis.⁶³ In *Ahousaht Indian Band and Nation v. Canada*, the BC Supreme Court concluded that five member bands of the Nuu-Chah-Nulth Nation hold an Aboriginal right to “fish for any species of fish within the environs of their territories and to sell that fish.”⁶⁴ This case was appealed to the BC Court of Appeal, which largely upheld

the lower court’s decision but excluded fishing for geoduck as it is a fishery of recent origin.⁶⁵ In late summer 2011, Canada filed an application for leave to appeal this decision to the Supreme Court of Canada.⁶⁶ The Court remanded the decision back to the BC Court of Appeal for reconsideration in accordance with the Court’s decision in *Lax Kw’alaams*.⁶⁷

Several other groups have been unable to prove in court an Aboriginal right to fish for economic purposes. In *Van der Peet*, the Supreme Court of Canada determined that the Stó:lō people failed to demonstrate an Aboriginal right to exchange fish for money or other goods since this practice was not a central, significant, or defining feature of the Stó:lō society.⁶⁸ In *R. v. N.T.C. Smokehouse*, the Supreme Court of Canada also determined that the Sheshaht and Opetchesaht peoples do not hold a right to exchange fish for money or other goods because the pre-contact sales of fish were “few and far between.”⁶⁹ The Court similarly did not find a Coast Tsimshian right to “harvest and sell on a commercial scale all species of fish and fish products found within the Lax Kw’alaams’ claimed territories.”⁷⁰ The BC Provincial Court did not find a Thompson or Shuswap right to exchange fish for money or other goods⁷¹ or an Anahem or Ts’ilhqot’in right to sell salmon commercially.⁷²

Where a right to fish for economic purposes exists, the form of priority that attaches to this right will be different than the priority that attaches to a right to fish for FSC purposes. Unlike FSC fishing rights, which are internally limited by the food, social, and ceremonial needs of the Aboriginal group holding the right, economic needs are limited only by market demand and the availability of the resource.⁷³ An economic fishing right does not grant an exclusive fishery to Aboriginal people and does not extinguish the common law right of public access to the fishery.⁷⁴ Rather, an economic right to fish requires that the government allocate the resource in a manner respectful of the fact that holders of constitutional rights have priority over other users.⁷⁵ In doing so, “objectives such as the pursuit of economic and regional fairness and the recognition of the historical reliance upon, and participation in, the fishery by non-aboriginal groups” may be considered.⁷⁶

The minister of fisheries and oceans need not await a judicial determination of rights before

providing Aboriginal groups with economic access to the fishery. In *R. v. Huovinen*, the BC Court of Appeal held that there was nothing to prevent the minister from authorizing the sale of fish caught under Aboriginal communal fishing licences, even in the absence of a proven Aboriginal commercial fishing right.⁷⁷ Where the objective underlying the provision of economic fisheries access is to ameliorate the disadvantaged position of an Aboriginal group, this will not be contrary to the equality provisions of the Charter.⁷⁸

Duty to consult

The Crown has a duty to consult an Aboriginal group where it has knowledge of the potential existence of an Aboriginal or treaty right and contemplates conduct or a decision that may adversely affect such right.⁷⁹ A spectrum of consultation exists that depends on the strength of claim to an Aboriginal right and the seriousness of the potential adverse effect on that right.⁸⁰

The Crown is expected to take a proactive and comprehensive approach to consultations. With regard to the fishery, DFO is expected to inform Aboriginal groups of conservation measures being taken⁸¹ and how such measures affect other users of the resource.⁸² DFO must “engage directly”⁸³ with Aboriginal peoples, though this does not necessarily require consultation with each Aboriginal group individually,⁸⁴ especially in the case of the Fraser River salmon fishery where a large number of Aboriginal groups may hold rights and interests.⁸⁵ With respect to the fishery, consultation must also be timely; this timeliness requires DFO to inform an Aboriginal group of planned conservation measures *before* they are implemented.⁸⁶

Although the duty to consult is held by the Crown, “there is some reciprocal onus on the [Aboriginal group] ... to make their concerns known, to respond to the government’s attempt to meet their concerns and suggestions, and to try to reach some mutually satisfactory solution.”⁸⁷ The Crown will not be prevented from taking action if an Aboriginal group refuses to participate in consultative processes.⁸⁸

Good faith consultation may give rise to a duty to accommodate,⁸⁹ which may take a variety of forms.⁹⁰ Key to any consultative process is the

Crown’s willingness to make changes based on information that emerges during the consultation,⁹¹ since the purpose is not simply to give the Aboriginal group “an opportunity to blow off steam before the Minister proceeds to do what she intended to do all along.”⁹² However, consultation does not carry a duty to reach an agreement with the Aboriginal group whose rights may be adversely affected.⁹³ Accommodation does not amount to an Aboriginal “veto” over what can be done, but entails a “balancing of interests, of give and take.”⁹⁴ As articulated by the Supreme Court of Canada in *Beckman v. Little Salmon / Carmacks First Nation*, the existence of a non-Aboriginal “stake in the situation is of considerable importance”⁹⁵ and at the end of the day “somebody has to bring consultation to an end and weigh up the respective interests.”⁹⁶

Treaty rights in the fishery

Several historical and modern treaties negotiated between the Crown and First Nations refer to Aboriginal participation in the fisheries. The Douglas Treaties are described above in the section on the legal historical context to 1982. In 1992, the BC Treaty Commission was established under the *Treaty Commission Act* to facilitate the negotiation of modern treaties in British Columbia.⁹⁷ At the time of writing this Report, the only modern agreements in force involving Fraser River salmon stocks are the Tsawwassen First Nation Final Agreement and the Maa-Nulth Final Agreement. In addition, the Yale First Nation Final Agreement, initialled by negotiators on February 5, 2010, has been ratified by the Yale First Nation and the province. Following ratification of the Yale First Nation Final Agreement by Canada, the parties will establish an effective date for the treaty.⁹⁸ For a further discussion of modern treaties, see the section on Aboriginal fishing policies and programs in Chapter 5, Sockeye fishery management.

Fisheries management in the context of Aboriginal and treaty rights

The law of Aboriginal and treaty rights is dynamic and evolving. Analytical frameworks for the determination of Aboriginal and treaty rights have been set out by the Supreme Court of Canada. However, these analyses have not been judicially applied

for most Aboriginal groups asserting rights in the Fraser River sockeye salmon fishery. The courts have not comprehensively determined fishing rights in British Columbia, and so there remains legal uncertainty as to the management, economic, geographic, or other dimensions that these rights may or may not include.

Aboriginal rights are not uniformly held and must be determined on a group-by-group basis in a fact-specific, contextual manner. I am advised that the determination of Aboriginal rights and title with respect to specific Aboriginal groups has entailed lengthy and intensive hearings over the course of months or years: the *Ahousaht* trial lasted 110 days, while the *Delgamuukw* and *Chilcotin* trials required 384 days and 339 days, respectively.⁹⁹ In comparison, I heard 133 days of testimony and submissions on a broad range of topics, not directed at determining the existence of Aboriginal rights.

I accept that the existence and content of Aboriginal rights is a controversial issue subject to ongoing litigation. Several participants appearing before me, Aboriginal and non-Aboriginal, submit that my Terms of Reference do not provide me with jurisdiction to make rulings or findings of fact in respect of Aboriginal or treaty rights and that I am not called upon to do so.¹⁰⁰ Considering my Terms of Reference and the timeframe for this Inquiry, I agree with participants that I am not well placed to make any determination of Aboriginal rights, including any right to fish.

As Commissioner, I am tasked with providing recommendations that will endure into the future, despite the dynamic and evolving nature of the law. In acknowledging the legal uncertainty that exists, my recommendations will consider fundamental principles of Aboriginal and treaty rights set out by the Supreme Court of Canada. In my view, many of these principles apply equally to policy as to rights. Although I will not rule on the existence or content of Aboriginal rights, I will consider the principles underlying Aboriginal and treaty rights as a guide.

■ Federal legislation

Several federal statutes govern the Fraser River sockeye salmon fishery.¹⁰¹ Many of these statutes, as well as key regulations, are discussed below.

The Department of Fisheries and Oceans Act

The minister of fisheries and oceans exercises his or her responsibility for Canadian fisheries through the activities of the Department of Fisheries and Oceans. Although DFO has existed in some form since 1868, the federal government enacted the *Department of Fisheries and Oceans Act* in 1978. This legislation sets out the powers, duties, and functions of the minister and empowers the minister to enter into agreements with any province (or provincial agency) regarding fisheries programs.

The Fisheries Act

The *Fisheries Act* is the primary statutory authority for the management and regulation of fisheries in Canada. The *Fisheries Act* and its regulations provide legislative authority for the conservation of fisheries resources and habitat, for the establishment and enforcement of standards for conservation, and for the determination of access to and allocation of the resource.

Subsection 7(1) of the *Fisheries Act* provides the minister with broad discretion to issue or authorize licences and leases for fisheries or fishing, as informed and constrained by case law and administrative law principles. The key jurisprudence on section 7 has established the following:

- The provision was intended to give the minister very broad discretion and thus significant deference should be granted to the minister, and
- The minister's exercise of discretion is subject only to these things:
 - express limitations in the *Fisheries Act*, limitations imposed under the Act by regulations made under section 43 of the Act, and limitations imposed by other legislation;
 - constitutional limitations, land claims agreements, and case law; and
 - the requirements of administrative law, which include respect for the principles of natural justice, basing his or her decisions on relevant considerations, avoiding arbitrariness, and acting in good faith.¹⁰²

Sections 32, 34, 35, and 36 provide the legislative basis for the environmental protection of fish and fish habitat.* These provisions afford protection for fish and fish habitat from destruction by “means other than fishing”¹⁰³ and by the general and specific prohibitions on depositing pollutants in Canadian fisheries waters.¹⁰⁴ Section 35 is the primary habitat protection provision. It prohibits “harmful alteration, disruption or destruction of fish habitat” (HADD).¹⁰⁵ Subsection 35(2) provides relief from this prohibition; it allows a HADD to occur with the minister’s authorization, or pursuant to regulations. “Fish habitat” is a broad concept. It is defined as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes,” in both marine and freshwater environments.¹⁰⁶

While DFO’s habitat-related regulatory work focuses on section 35, other sections of the *Fisheries Act* also relate to habitat protection and pollution prevention. These include the provisions regarding fishways (sections 20–22, 26, and 27), prohibitions on the use of explosives to hunt or kill fish (section 28), and prohibitions on the destruction of fish by any means other than fishing (section 32). (For a more detailed discussion of these provisions, see Chapter 7, Enforcement.)

Section 36 prohibits persons, except as authorized by regulation, from depositing or permitting the deposit of deleterious substances of any type “in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.”¹⁰⁷ This section of the *Fisheries Act* is administered by Environment Canada and not by DFO.

Regulations affecting the Fraser River sockeye fishery

The following regulations under the *Fisheries Act* govern the Fraser River sockeye salmon fishery and are discussed below:

- *Fishery (General) Regulations*, SOR/93-53
- *Pacific Fishery Regulations*, 1993, SOR/93-54
- *Pacific Fishery Management Area Regulations*, 2007, SOR/2007-77
- *British Columbia Sport Fishing Regulations*, 1996, SOR/96-137
- *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332
- *Management of Contaminated Fisheries Regulations*, SOR/90-351
- *Pacific Aquaculture Regulations*, SOR/2010-270

The *Fishery (General) Regulations* govern the operation of the fisheries and apply to all fisheries (commercial, recreational, and Aboriginal communal fisheries). They contain provisions regarding the establishment and variation of fishery closures, fishing quotas, and fish size and weight limits (Part I); licences and registration (Part II); identification of fishing vessels and fishing gear (Part III); and fishery observers (Part V). These regulations also contain provisions that authorize DFO to engage personnel for enforcement and administration of the *Fisheries Act*, and they relate to fish habitat and enforcement matters (Part VI).

The *Pacific Fishery Regulations*, 1993, apply to commercial fisheries, and Part VI governs the salmon fishery. The *Pacific Fishery Management Area Regulations*, 2007, describe the surf line and divide the Canadian fisheries waters of the Pacific Ocean into management areas and sub-areas.¹⁰⁸ These management areas and sub-areas are referenced when describing fishery openings and closures.

The *British Columbia Sport Fishing Regulations*, 1996, apply to sport fishing in Canadian fisheries waters of the Pacific Ocean and of British Columbia, setting close times, fishing quotas, and size limits for all sport fisheries in the province. The *Aboriginal Communal Fishing Licences Regulations* cover the issuance of communal licences to Aboriginal organizations. The licences regulate communal fishing activities.

In addition, there are several regulations governing the discharge of effluents that could impact Fraser River sockeye (for example, pulp

* I note that Part 3, Division 5, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which received royal assent on June 29, 2012, amends these sections of the *Fisheries Act*. As a result, the references in this chapter to these sections may not reflect the current law in Canada. Bill C-38 is discussed in detail in Volume 3, Chapter 3, Legislative amendments.

and paper and metal mining effluents).¹⁰⁹ (Canada has recently proposed the Wastewater Systems Effluent Regulation; see Chapter 6, Habitat management.) The DFO regional director general (RDG) is authorized by the *Management of Contaminated Fisheries Regulations* to close any fishery if the RDG has reason to believe that fish in that area are contaminated.¹¹⁰

In February 2009, the BC Supreme Court determined in *Morton v. British Columbia (Agriculture and Lands)* that salmon aquaculture is a “fishery” under the jurisdiction of the federal government, striking down provincial legislation regulating salmon farms.¹¹¹ In July 2010, the proposed federal *Pacific Aquaculture Regulations* (PAR) under the *Fisheries Act* were posted to the *Canada Gazette* Part I. They came into force on December 18, 2010.¹¹² The PAR apply to aquaculture in the territorial sea of Canada off the coast of British Columbia, the internal waters of Canada off the British Columbia coast that are not within British Columbia, the internal waters of Canada in British Columbia and any facility in the province from which fish may escape into Canadian fisheries waters.¹¹³ The PAR allow the minister to issue aquaculture licences.¹¹⁴ Section 4 is the key provision; it enables the minister to make conditions of licence for the proper management and control of the fishery. The PAR also include prohibitions on aquaculture operators keeping incidental catch (section 5) and operating without a licence (section 7).

The Oceans Act

The *Oceans Act* is the primary piece of legislation governing oceans management. It mandates an integrated ecosystem-based approach to how ocean activities are managed. It specifies that DFO is to lead and coordinate activities to that end, and the competent minister is the minister of fisheries and oceans.¹¹⁵ The *Oceans Act* provides the department with the authority to engage in integrated management, to establish marine protected areas, and to improve Canada’s management of the marine environment.

Section 29 of the *Oceans Act* requires the minister to lead and facilitate the development and implementation of “a national strategy for

the management of estuarine, coastal and marine ecosystems” in Canada’s oceans. Section 30 of the *Oceans Act* specifies that the three principles on which the national strategy is based are sustainable development, integrated management, and the precautionary approach (see discussion of the precautionary principle / approach below). Section 31 requires the minister to lead the development of “plans for the integrated management of all activities or measures in or affecting” Canada’s oceans. Section 32 directs or empowers the minister to develop and coordinate government policies and programs with respect to activities or measures affecting coastal and marine waters. Subsection 41(1)(d) of the *Oceans Act*, and section 180 of the *Canada Shipping Act, 2001*, provide that the Canadian Coast Guard (Coast Guard) is the lead federal agency responsible for ship source and mystery source pollution incidents in Canadian waters.¹¹⁶

Section 42 of the *Oceans Act* sets out the minister’s powers with respect to marine sciences. It provides as follows:

42. In exercising the powers and performing the duties and functions assigned by paragraph 4(1)(c) of the Department of Fisheries and Oceans Act, the Minister may

- (a) collect data for the purpose of understanding oceans and their living resources and ecosystems;
- (b) conduct hydrographic and oceanographic surveys of Canadian and other waters;
- (c) conduct marine scientific surveys relating to fisheries resources and their supporting habitat and ecosystems;
- (d) conduct basic and applied research related to hydrography, oceanography and other marine sciences, including the study of fish and their supporting habitat and ecosystems;
- (e) carry out investigations for the purpose of understanding oceans and their living resources and ecosystems;
- (f) prepare and publish data, reports, statistics, charts, maps, plans, sections and other documents;
- (g) authorize the distribution or sale of data, reports, statistics, charts, maps, plans, sections and other documents;

- (h) prepare in collaboration with the Minister of Foreign Affairs, publish and authorize the distribution or sale of charts delineating, consistently with the nature and scale of the charts, all or part of the territorial sea of Canada, the contiguous zone of Canada, the exclusive economic zone of Canada and the fishing zones of Canada and adjacent waters;
- (i) participate in ocean technology development; and
- (j) conduct studies to obtain traditional ecological knowledge for the purpose of understanding oceans and their living resources and ecosystems.

In 2002, DFO released Canada's Oceans Strategy, which creates a framework that combines the three principles articulated in section 30.¹¹⁷ While the *Oceans Act* and the *Fisheries Act* complement each other, section 35 of the *Fisheries Act* (the HADD provision) is generally applied to localized works, usually streamside or at the shoreline, which could impact fish habitat. The focus of the *Oceans Act* is on integrated management of marine resources and large-scale conservation measures such as marine protected areas.¹¹⁸

The Species at Risk Act

Under the *Species at Risk Act* (SARA), the minister of fisheries and oceans is the competent minister for listed aquatic species other than those in lands administered by Parks Canada.¹¹⁹ The department's role includes consideration of listed aquatic species at risk and their habitats in regulatory reviews and environmental assessments, as well as providing advice on recovery strategies and action plans. Currently, no sockeye salmon population or population grouping is listed as a species at risk under SARA. (For a discussion of SARA and Fraser River sockeye, see Chapter 11, Cultus Lake.)

SARA expressly recognizes that "wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological, and scientific reasons."¹²⁰ The purposes of SARA are "to prevent wildlife [including aquatic] species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are extirpated, endangered or threatened as a result of human activity and to manage species of special concern to prevent them from becoming endangered or threatened."¹²¹ SARA recognizes Canada's commitment to biodiversity and the precautionary principle, both in the preamble and in reference to carrying out a recovery strategy, action plan, or management plan.¹²²

DFO is one of three federal government departments or agencies charged with SARA's implementation¹²³ (the others being Environment Canada and Parks Canada*). It is responsible for protecting aquatic species at risk (other than individuals in or on federal lands administered by Parks Canada) and their critical habitat on federal lands. DFO's area of responsibility includes the legal requirements to enforce automatic prohibitions; to develop recovery strategies, management plans, and action plans within specified timelines; to identify and protect the critical habitat of listed endangered or threatened species, and of listed extirpated species, if a recovery strategy has recommended their reintroduction; and to satisfy co-operation and consultation requirements.¹²⁴

The Canadian Environmental Assessment Act

Section 5 of the *Canadian Environmental Assessment Act* (CEAA) requires environmental assessment of "projects" (undertakings related to physical works, or activities prescribed by the *Inclusion List Regulations*¹²⁵) if a "federal authority" is the project proponent, provides financial assistance, or provides federal lands for the project.[†]

* Note that the Parks Canada Agency itself currently falls under the responsibility of the Department of the Environment; see *Parks Canada Agency Act*, SC 1998, c. 31, s. 2.

† I note that Part 3, Division 1, of Bill C-38, *Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which received royal assent on June 29, 2012, repeals the *Canadian Environmental Assessment Act* and replaces it with the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEAA may not reflect the current law in Canada. Bill C-38 is discussed in detail in Volume 3, Chapter 3, Legislative amendments.

Some decisions made under other acts or regulations will also trigger environmental assessment as described in the *Law List Regulations*.¹²⁶ Part VII (Fisheries) of the *Inclusion List Regulations* mandates that there be an environmental assessment of activities requiring authorization under sections 32, 35, or 36 of the *Fisheries Act* (that is, activities that destroy fish by means other than fishing; that harmfully alter, disrupt, or destroy fish habitat; or that result in the deposit of deleterious substances in water frequented by fish). If no federal authority exercises a power, duty, or function listed in section 5 of the CEEA, environmental assessment can still be triggered if the project may cause significant adverse environmental effects in another province, outside Canada, in a national park or park reserve, on lands with various First Nations interests, or on federal lands.

By virtue of section 7 of the CEEA, an environmental assessment of a project is not required where the project is described in an exclusion list¹²⁷ or falls under circumstances described in section 7.

The Canadian Environmental Protection Act

The *Canadian Environmental Protection Act* (CEPA) contains a commitment to the precautionary principle. CEPA aims to protect the environment and human health by managing marine pollution, disposal at sea, toxic substances, and other sources of pollution. CEPA contains provisions about international water pollution and enables the federal government to take action in instances where a province fails to address a problem. In the case of environmental emergencies, if no other federal or provincial regulations exist, the provisions of CEPA govern. Under CEPA, after consultation with any other affected minister, the minister of the environment has the authority to issue environmental objectives, guidelines, and codes of practice to prevent and reduce land-based sources of marine pollution.*

Section 21 empowers Environment Canada to issue environmental objectives and to release guidelines and codes of practice to prevent and

reduce marine pollution from land-based sources. Section 127 enables Environment Canada to issue permits authorizing disposal of waste or other matter, subject to section 129 (any conditions that the minister considers necessary for the protection of marine life). Section 131 provides that persons disposing of substances under a permit, or on an emergency basis pursuant to section 130, are not subject to section 36(3) of the *Fisheries Act* (deposit of deleterious substance). Permits for disposal of fish wastes are required for aquaculture.

A range of tools are available for managing the risks associated with toxic substances under CEPA including regulations, codes of practice and guidelines, pollution prevention plans, and environmental emergency plans.

Under Part 3, the minister has established and must maintain the National Pollutant Release Inventory (NPRI).¹²⁸ The NPRI provides facility-specific information on the release, disposal, and recycling of over 300 substances, including toxic substances.¹²⁹ Industrial and commercial facilities that meet the NPRI reporting criteria must report information about pollutant releases to Environment Canada annually.¹³⁰ Section 44 is the key legislative provision for the regulation of contaminants. It directs Environment Canada to monitor environmental quality, and to conduct research and studies relating to pollution and contamination.

Part 4 of CEPA sets out provisions enabling the minister to require pollution prevention planning, so as to minimize or avoid the creation of pollutants. Pollution prevention planning allows facilities, businesses, or industries to select specific measures for meeting objectives established under CEPA.¹³¹

Toxic substances under CEPA are listed in Schedule 1. A substance is considered to pose unacceptable risks – and consequently may be added to Schedule 1 – if it meets any of the following criteria (set out in section 64):

- it has or may have an immediate or long-term adverse impact on the environment;
- it poses or may pose a danger to the environment on which life depends; or
- it is or may be harmful to human life or health.

* In 1987, the Canadian Council of Resource and Environment Ministers, now the Canadian Council of Ministers of the Environment, released the *Canadian Water Quality Guidelines*, which included guidelines for the protection of freshwater life. Since their release, science-based guideline derivation procedures have been established and approved nationally for specific media and resource uses (PPR 15, Effluents, p. 17).

The minister may require any person using and/or releasing a Schedule 1 toxic substance to prepare and implement a pollution prevention plan (subsection 56(1)).

Part 5 of CEPA governs the assessment of substances to determine which are toxic and to manage them accordingly. Part 7 of CEPA provides pollution control powers for nutrients and for the protection of the marine environment from land-based sources of pollution. “Land-based sources” are defined under CEPA as “point and diffuse sources on land from which substances or energy reach the sea by water, through the air or directly from the coast.”¹³² “Marine pollution” means “the introduction by humans, directly or indirectly, of substances or energy into the sea that results, or is likely to result, in (a) hazards to human health; (b) harm to living resources or marine ecosystems; (c) damage to amenities; or (d) interference with other legitimate uses of the sea.”¹³³ CEPA grants the minister power to issue environmental objectives, codes of practice, and guidelines specifically for the prevention and reduction of marine pollution from land-based sources.¹³⁴

Part 8 of CEPA provides that where no government regulations exist, the ministers of the environment and of health have the authority to require emergency plans for those substances* that they have declared toxic.¹³⁵

Additional federal legislation relevant to the regulation of the fishery

Section 5(1) of the *Navigable Waters Protection Act* (NWP) provides that no work “shall be built or placed in, on, over, through or across any

navigable water” without authorization. Prior to amendment of the NWP in 2009, this requirement for authorization was contained in subsection 5(1)(a), a subsection that no longer exists. While the *Law List Regulations* prescribe that an authorization under the former subsection 5(1)(a) of the NWP triggers an environmental assessment under the CEAA, the *Law List Regulations* have not been updated to reflect the change in the relevant section of the NWP. The NWP is administered by the federal Department of Transport, and not by DFO.

The *Canada Water Act* provides for the co-operative management of water quality and water resource planning in Canada. Where an agreement cannot be reached with a province, the Act permits unilateral action by Canada with respect to federal waters or other waters of “significant national interest,” or where water quality has become a matter of “urgent national concern” (section 11).[†]

Part I of the *Canada Water Act* authorizes the minister of the environment to establish consultative arrangements and enter agreements with the provinces for water resource management.¹³⁶ The minister of the environment may enter into intergovernmental arrangements to establish bodies to consult on water resource matters and to advise on and facilitate the coordination or implementation of water priorities, policies, and programs.¹³⁷ Part II of the *Canada Water Act* deals with water quality management.[‡] It allows the minister to work in co-operation with provinces in water quality management of federal or inter-jurisdictional waters[§] where the water quality has become a matter of “urgent national concern.”¹³⁸ Such co-operative agreements shall designate the waters to which they relate as a “water quality management area.”¹³⁹

* “Substance” refers to a substance on a list established under the regulations or interim orders made under this part of CEPA (*Environmental Emergency Regulations*, SOR/2003-307, s. 193).

† *Canada Water Act*, ss. 5, 6, 11, and 13. “Water resource management” means “the conservation, development and utilization of water resources and includes, with respect thereto, research, data collection and the maintaining of inventories, planning and the implementation of plans, and the control and regulation of water quantity and quality” (*Canada Water Act*, s. 2(1)).

‡ “Water quality management” means “any aspect of water resource management that relates to restoring, maintaining or improving the quality of water” (s. 2(1)).

§ *Canada Water Act* (s. 2(1)) defines “[f]ederal waters” as, “other than in Yukon, waters under the exclusive legislative jurisdiction of Parliament and, in Yukon, waters in a federal conservation area within the meaning of section 2 of the *Yukon Act*”; and “[i]nter-jurisdictional waters” means “any waters, whether international, boundary or otherwise, that, whether wholly situated in a province or not, significantly affect the quantity or quality of waters outside the province.”

The Canadian Food Inspection Agency (CFIA), under the minister of agriculture and agri-food, administers the *Health of Animals Act*, which was amended to include aquatic animals, like salmon, in December 2010. Under this Act, “disease” includes “(a) a reportable disease and any other disease that may affect an animal or that may be transmitted by an animal to a person, and (b) the causative agent of any such disease.”¹⁴⁰ Reportable diseases are “diseases that are of significant importance to animal health and to the Canadian economy.”¹⁴¹ Reportable diseases are set out in the *Reportable Diseases Regulations*, which came into force in January 2011.¹⁴² The *Reportable Diseases Regulations* list several salmon diseases. (The *Health of Animals Act* and its related regulations are discussed further in Chapter 9, Fish health management.)

Regulation of the fishery by other federal departments

Other federal departments have additional legislative mandates to regulate areas that affect the fishery. Transport Canada oversees marine infrastructure for pleasure craft, small vessels, and large commercial vessels, as well as transport of dangerous goods by water. Transport Canada also has jurisdiction over aquaculture to the extent that it may issue navigable water permits to salmon farms.¹⁴³ In doing so, it may conduct reviews under the *Canadian Environmental Assessment Act*.¹⁴⁴ The *Navigable Waters Protection Act* allows for the removal of obstructions from navigable water and requires approvals for planned obstructions.¹⁴⁵

Transport Canada and the National Energy Board regulate various aspects of linear development (for example, road and rail networks, bridges, electrical transmission lines, and seismic and interprovincial oil and gas lines).¹⁴⁶ Linear development projects are also assessed by DFO under its *Fisheries Act*, section 35, authority.

As noted above, the CFIA is responsible for administration of the *Health of Animals Act*, its related regulations, and the *Feeds Act*.¹⁴⁷ The CFIA co-administers the National Aquatic Animal Health Program with DFO.

Bill C-38

I note that Part 3 of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which received royal assent on June 29, 2012 enacts in Part 3, Division 1, a new *Canadian Environmental Assessment Act, 2012* (CEAA, 2012), which repeals the *Canadian Environmental Assessment Act* in force at the time of the hearings and report writing. Bill C-38 also makes a number of amendments to the *Fisheries Act*.

Although the evidence I received was in the context of the regulatory scheme in place at the time of the hearings, a number of the amendments likely change the way the federal government, and DFO and Environment Canada in particular, manage environmental assessments and fish habitat. In Volume 3, Chapter 3, Legislative amendments, I summarize these changes and address the possible implications of these amendments in light of this Commission’s evidence and my findings and recommendations.

■ Provincial legislation and local government laws

While the lead role in managing the Fraser River sockeye fishery belongs to the federal government, by virtue of section 92 of the Constitution, the province has jurisdiction over “property and civil rights” and the “management of public lands” in the province. The following are provincial statutes that relate to the Fraser River sockeye salmon fishery:

- BC *Fisheries Act*, RSBC 1996, c. 149
- BC *Water Act*, RSBC 1996, c. 483
- BC *Wildlife Act*, RSBC 1996, c. 488
- BC *Forest and Range Practices Act*, SBC 2002, c. 69
- BC *Environmental Management Act*, SBC 2003, c. 53
- BC *Fish Protection Act*, SBC 1997, c. 21
- BC *Fish Inspection Act*, RSBC 1996, c. 148
- BC *Environmental Assessment Act*, SBC 2002, c. 43

The BC *Fisheries Act* provides for the licensing and regulatory control of activities associated with commercial fisheries, including licensing of

commercial fishers, fish processing plants, and fish buying stations, as well as the licensing of recreational fishers. Section 8 of the provincial *Fisheries Act* mandates that a person must not fish or attempt to fish “unless the person holds a valid licence issued for that purpose and has paid the fee prescribed.” While subsection 26(2)(a) of this Act authorizes the Lieutenant Governor in Council to make regulations for “safe and orderly aquaculture,” the BC Supreme Court held this section to be outside the province’s jurisdiction insofar as it applies to finfish aquaculture.¹⁴⁸ This court decision is discussed further in Chapter 8, Salmon farm management.

The BC *Water Act* is the primary statute for managing works in and about a body of water and the diversion of water. It vests in the government of British Columbia the right to use and regulate flow of all stream water except where private rights have been established.¹⁴⁹ The *Water Regulation* sets out works that may be permitted under the *Water Act*’s notification process, including restoration and maintenance of fish habitat.¹⁵⁰ (For further detail about the *Water Act*, see Chapter 6, Habitat management.)

The BC *Wildlife Act* governs the interaction of people and provincially managed wildlife, which includes fish, and also provides in section 12 that a person must hold a valid licence in order to fish in non-tidal waters. The *Forest and Range Practices Act* regulates forestry practices impacting the Fraser River sockeye salmon habitat. (For further detail about the *Forest and Range Practices Act*, see Chapter 6, Habitat management.)

The BC *Environmental Management Act* (EMA) provides the BC Ministry of Environment with the authority to manage, protect, and enhance the environment. The *Waste Discharge Regulation*, made under the EMA, prescribes entities that require authorization before discharging waste into the environment.¹⁵¹ (For further detail about the *Environmental Management Act*, see Chapter 6, Habitat management.)

The BC *Fish Protection Act* (FPA), allows for sensitive stream designation to protect a population of fish whose sustainability is at risk because of inadequate water flow within a stream or habitat degradation.¹⁵² The FPA prohibits the construction of bank-to-bank dams on designated “protected rivers,” including the

Fraser River.¹⁵³ Designated sensitive streams are subject to recovery plans and, for these streams, the effects of any development on fish and fish habitat are considered in water licensing decisions.¹⁵⁴ The FPA also provides authority to issue temporary orders to protect stream flow levels in times of drought.¹⁵⁵

The FPA also empowers the Lieutenant Governor in Council to establish regulations to set out policy directives regarding protection and enhancement of riparian areas.¹⁵⁶ These regulations may be established after consultation with representatives of the Union of British Columbia Municipalities (UBCM). (For further detail about the *Riparian Areas Regulation*, see below).

The BC *Fish Inspection Act* provides the authority to regulate activities concerning the handling, processing, storing, grading, packaging, marking, transporting, marketing, and inspection of fish and fish products. The *Fish Inspection Regulations* are intended to ensure that fish processed and sold within the province have met specified requirements.¹⁵⁷

The BC *Environmental Assessment Act* applies to some projects including mine, energy, water management, waste disposal, food processing, transportation, and tourist resorts.

As previously noted, the federal government became responsible for aquaculture operations in and around the waters and coast of British Columbia in 2010. The province remains responsible for issuing tenures related to aquaculture. The Government of Canada passed the *Pacific Aquaculture Regulations* in 2010, and entered into an agreement with the province entitled the Canada–British Columbia Agreement on Aquaculture Management.¹⁵⁸ This agreement sets out areas of federal and provincial responsibility. The agreement provides that “Canada may issue aquaculture licences under the *Fisheries Act* for all aquaculture activities to be undertaken in the province of British Columbia” and that “British Columbia may issue land tenures under the *Land Act* for aquaculture purposes.”¹⁵⁹ It provides for the sharing of information; collaboration on public reporting; and coordination of inspections, compliance, and enforcement activities.¹⁶⁰ It also provides that DFO is the lead federal agency for the management of aquaculture in British Columbia, while the provincial Ministry of Agriculture will “represent a provincial view on such matters in

dealing with Canada.”¹⁶¹ Further, it states that the parties will establish a management committee to oversee implementation of the 2010 agreement.¹⁶² (For further detail about federal and provincial responsibility for regulation of aquaculture, see Chapter 8, Salmon farm management.)

Municipal land use planning and bylaws

The BC Legislature has delegated authority over land use planning and zoning to local governments.¹⁶³ The *Riparian Areas Regulation* (RAR) was enacted under subsection 12(1) of the provincial *Fish Protection Act*. The RAR provides local governments with direction to improve the protection of fish and fish habitat in British Columbia.¹⁶⁴ The purpose of the RAR is to “establish directives to protect riparian areas from development so that the areas can provide natural features, functions and conditions that support fish and life processes,”¹⁶⁵ and to facilitate co-operation between DFO, the provincial Ministry of Environment (MOE), and the UBCM.¹⁶⁶

DFO, MOE, and UBCM have entered into the Intergovernmental Cooperation Agreement Respecting the Implementation of British Columbia’s Riparian Areas Regulation (RAR Agreement).¹⁶⁷ The purpose of the RAR Agreement is to define the roles and responsibilities of the three governmental bodies and create a management structure to oversee the implementation and ongoing delivery of the RAR.¹⁶⁸ The RAR Agreement also established a tripartite steering committee.¹⁶⁹

The RAR applies to municipalities and regional districts in the Lower Mainland, on much of Vancouver Island, in the Islands Trust area, and in parts of the Southern Interior. Adoption is voluntary for local governments not covered by the regulation.¹⁷⁰ Where it applies, the RAR covers all streams, rivers, creeks, ditches, ponds, lakes, springs, and wetlands that are connected (above ground) to a body of water that provides fish habitat; the RAR does not apply to marine or estuarine areas.¹⁷¹

The RAR applies to new residential, commercial, and industrial development on land under local government jurisdiction, which includes private land and the private use of provincial Crown land.¹⁷² Under the RAR, development is defined as:

any of the following associated with or resulting from the local government regulation or approval of residential, commercial or industrial activities or ancillary activities to the extent that they are subject to local government powers under Part 26 of the *Local Government Act*:

- (a) Removal, alteration, disruption, or destruction of vegetation;
- (b) Disturbance of soils;
- (c) Construction or erection of buildings and structures;
- (d) Creation of non-structural impervious or semi-impervious surfaces;
- (e) Flood protection works;
- (f) Construction of roads, trails, docks, wharves, and bridges;
- (g) Provision and maintenance of sewer and water services;
- (h) Development of drainage systems;
- (i) Development of utility corridors; and
- (j) Subdivision as defined in section 872 of the *Local Government Act*.¹⁷³

The RAR does not apply to development or development variance permits issued to enable reconstruction or repair of permanent structures described in subsection 911(8) of the *Local Government Act*, if the structure remains on its existing foundation.¹⁷⁴ It also does not apply to agriculture and mining activities, hydroelectric facilities, forestry, federal, and First Nations reserve lands, parks and parkland, and institutional developments.¹⁷⁵ Nor does it apply to existing permanent structures, roads, and other development within the riparian protection area or developments that were approved before the RAR was enabled.¹⁷⁶

Local governments can implement the RAR by adding a requirement to produce a qualified environmental professional (QEP) assessment report to existing development permit and approval processes.¹⁷⁷ Alternatively, a local government can incorporate a level of protection consistent with the RAR into their zoning and general by-laws.¹⁷⁸ Regardless of the tool employed by local government, the regulatory process must include a definition of streams and riparian areas consistent with the RAR, a means to trigger regulatory action for development activities proposed within riparian assessment areas, and a means of requiring a QEP

assessment report that complies with the RAR and the RAR assessment methods.¹⁷⁹ In areas of British Columbia where the RAR is not in effect, DFO's habitat referral process is used.¹⁸⁰ (For a description of the habitat referral process, see the DFO, Environment Canada, and provincial policies and practices section of Chapter 6, Habitat management, which provides more detail on the RAR and its implications for freshwater habitat management.)

■ International law

This section summarizes international law directly related to the conservation and management of Fraser River sockeye salmon.* As a member of a broader international community, Canada has in recent decades made certain commitments toward sustainable fisheries and environmental protections. These commitments are relevant to Canada's domestic management of the Fraser River sockeye salmon fishery. In addition, as described further in Volume 2 of this Report, Fraser River sockeye salmon spend a considerable portion of their lives in the North Pacific Ocean beyond Canadian waters, thus requiring international co-operation in this area.

International agreements

Canada has entered into a number of international agreements relevant to the management and conservation of Fraser River sockeye salmon. These agreements recognize Canada's interests in Fraser River sockeye and also set out certain of its obligations with respect to harvest management, habitat protection, scientific research, and other matters.

United Nations Convention on the Law of the Sea

Canada signed the *United Nations Convention on the Law of the Sea* (UNCLOS) in December 1982 and ratified it in November 2003.¹⁸¹ The UNCLOS

is a foundational treaty that provides a framework for the international law of the sea. Among other things, the UNCLOS governs fisheries and the protection of the marine environment. It mandates that the country in which an anadromous fish species originates has the primary interest in and responsibility for that species.¹⁸² Canada has the primary interest in and responsibility for Fraser River sockeye salmon.¹⁸³

The UNCLOS is relevant to the management and conservation of Fraser River sockeye in several ways. This convention confirms the existence of different marine zones under international law (internal waters, territorial seas, the exclusive economic zone, and the high seas) and sets out certain rules governing fisheries in these marine areas.¹⁸⁴ For example, the UNCLOS prohibits fishing for salmon on the high seas.¹⁸⁵ The UNCLOS also establishes a framework for marine environmental protection, including Canada's obligation to prevent, reduce, and control marine pollution from all sources; avoid polluting the environment of other countries; and protect rare or fragile ecosystems and the habitat of threatened or endangered species.¹⁸⁶ The UNCLOS also sets out a framework for marine scientific research,¹⁸⁷ including Canada's obligation to promote and facilitate the development and conduct of marine scientific research.¹⁸⁸

Regional fishing agreements or other multi-party agreements must be developed and interpreted in a manner consistent with the UNCLOS.¹⁸⁹

Pacific Salmon Treaty

In 1937, Canada and the United States ratified the *Convention for the Protection, Preservation and Extension of the Sockeye Salmon Fisheries of the Fraser River System* (1937 Convention).¹⁹⁰ This convention established the International Pacific Salmon Fisheries Commission and provided for the management of the Fraser River fishery within a defined area of the Pacific Coast, called the Convention Area.¹⁹¹

In March 1985, Canada and the United States ratified *An Agreement between the Government of*

* In its final submission, Canada sought an explicit statement that this description of international law does not constitute an expression of the Government of Canada's position on international law. In my view, the status of this Commission as independent of the Government of Canada makes such a statement unnecessary, as it is obvious that I have no mandate to speak on behalf of the Government of Canada.

*Canada and the Government of the U.S.A. concerning Pacific Salmon (Pacific Salmon Treaty).*¹⁹²

The Pacific Salmon Treaty replaces the 1937 Convention and provides for bilateral management of salmon originating in the waters of one country and which are subject to interception by the other country, or affect management of the other country's salmon, or affect biologically the stocks of the other country.¹⁹³

Article 3 of the Pacific Salmon Treaty articulates the following principles:

1. With respect to stocks subject to this Treaty, each Party shall conduct its fisheries and its salmon enhancement programs so as to:
 - (a) prevent overfishing and provide for optimum production; and
 - (b) provide for each Party to receive benefits equivalent to the production of salmon originating in its waters
2. In fulfilling their obligations pursuant to paragraph 1, the Parties shall cooperate in management, research and enhancement.
3. In fulfilling their obligations pursuant to paragraph 1, the Parties shall take into account:
 - (a) the desirability in most cases of reducing interceptions; and
 - (b) the desirability in most cases of avoiding undue disruption of existing fisheries; and
 - (c) annual variations in abundance of the stocks.

The Pacific Salmon Treaty creates the Pacific Salmon Commission (PSC) to replace the International Pacific Salmon Fisheries Commission.¹⁹⁴ The PSC consists of no more than eight commissioners, four appointed by each party.¹⁹⁵ Each party may also appoint four alternate commissioners.¹⁹⁶ The PSC is mandated to establish "panels" as specified in Annex I of the Pacific Salmon Treaty. They include the Fraser River Panel on Fraser River sockeye and pink salmon harvested in the Fraser Panel Area¹⁹⁷ (formerly the Convention Area under the 1937 Convention).¹⁹⁸ During the fishing season, the

Fraser River Panel may make orders for the adjustment of fishing times and areas, and the parties must give effect to these orders in accordance with their respective laws and procedures.¹⁹⁹ Annex IV, Chapter 4, of the Pacific Salmon Treaty also sets out a term-limited management plan for Fraser River sockeye and pink salmon.²⁰⁰

Other obligations on DFO established by the Pacific Salmon Treaty include submitting an annual report of fishing activities to the other party and to the PSC.²⁰¹ Parties are also required to submit preliminary information for the ensuing year, such as the estimated run size, the interrelationship between stocks, the spawning escapement required, the estimated total allowable catch, and the party's fisheries management intentions and domestic allocation objectives.²⁰²

The Pacific Salmon Treaty and Pacific Salmon Commission, particularly in respect of management of Fraser River sockeye, are discussed in greater detail in Chapter 5, Sockeye fishery management.

Convention on the Conservation of Anadromous Stocks of the North Pacific Ocean

Canada adopted the *Convention on the Conservation of Anadromous Stocks of the North Pacific Ocean* (North Pacific Anadromous Stocks Convention)²⁰³ in February 1992, and it came into force in February 1993. Parties to this convention are Canada, the United States, Japan, South Korea, and Russia. China participates informally in this convention but is not a party to it.²⁰⁴

The North Pacific Anadromous Stocks Convention prohibits directed fishing for anadromous fish stocks, such as Fraser River sockeye, within a "Convention Area" consisting of the waters of the North Pacific Ocean and its adjacent seas.* According to this convention, the incidental catch of anadromous fish in the Convention Area must be minimized, and such incidental catch must be immediately returned to the sea.²⁰⁵ Importantly, this convention sets out an enforcement scheme applicable to fishing in the Convention Area.²⁰⁶ It also establishes the

* Specifically, the North Pacific Ocean and its adjacent seas north of latitude 33° north and beyond the exclusive economic zones of the parties (North Pacific Anadromous Stocks Convention, Articles I and III).

North Pacific Anadromous Fish Commission, an international organization established to promote the conservation of anadromous stocks in the Convention Area²⁰⁷ by, among other things, evaluating enforcement actions taken by the parties, recommending scientific research activities, and promoting information exchange.²⁰⁸

Convention for a North Pacific Marine Science Organization

Canada adopted the *Convention for a North Pacific Marine Science Organization* in December 1990 and ratified it in October 1991.²⁰⁹ Parties to this convention are Canada, the United States, South Korea, Russia, Japan, and China.²¹⁰

This convention establishes an intergovernmental organization, the North Pacific Marine Science Organization, commonly referred to as PICES.²¹¹ PICES is mandated to promote and coordinate marine scientific research and information-sharing related to the North Pacific Ocean,* including research on the ocean environment; global weather and climate change; ocean flora, fauna, and ecosystems; and effects of human activities.²¹²

FAO Compliance Agreement

Canada accepted the United Nations Food and Agricultural Organization's *Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas* (FAO Compliance Agreement) in May 1994.²¹³ The agreement came into force in April 2003.

The FAO Compliance Agreement recognizes the duty of states, under international law and the UNCLOS, to take measures as necessary for the conservation of living resources in the high seas, and it seeks to address compliance with international conservation and management measures.²¹⁴ This agreement applies to all fishing vessels that are used or intended for fishing on the high seas.²¹⁵ Among other things, the FAO Compliance Agreement requires each party to “take such measures as may be necessary to ensure that fishing vessels entitled to fly its flag do not engage in any activity that undermines the

effectiveness of international conservation and management measures.”²¹⁶

Convention on Biological Diversity

Canada signed the *Convention on Biological Diversity* in June 1992 and ratified it that December.²¹⁷ This convention recognizes “the intrinsic value of biological diversity and of the ecological, social, economic, scientific, educational, cultural, recreational and aesthetic values of biological diversity and its components” and notes that “it is vital to anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at source.”²¹⁸

The *Convention on Biological Diversity* has, as objectives, the conservation of biological diversity, the sustainable use of biodiversity's components, and the fair and equitable sharing of the benefits arising from the utilization of genetic resources.²¹⁹ Biodiversity is defined as “the variability among living organisms from all sources” including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part.²²⁰ This includes diversity within species, between species, and of ecosystems.²²¹

This convention places obligations on Canada relevant to the management and conservation of Fraser River sockeye. For example, Article 7 states that each party, including Canada, “shall as far as possible and as appropriate” identify and monitor components of biological diversity important for conservation and sustainable use and to identify processes or activities which have or are likely to have significant adverse impacts on biological diversity.²²² The data derived from this identification and monitoring process must be maintained and organized.²²³ Article 8 focuses on in situ conservation, meaning the conservation of ecosystems and natural habitats and the maintenance and recovery of viable populations of species in their natural surroundings.²²⁴ Article 8 states that each party shall, among other things, and as far as possible and as appropriate, establish protected areas, regulate and manage biological resources important for the conservation of biological diversity, promote the protection of ecosystems and the maintenance of viable populations of species in natural

* Specifically with respect to the temperate and subarctic region of the North Pacific Ocean and its adjacent seas, especially northward from 30° north latitude (Article II, CNPMSO).

surroundings, rehabilitate and restore degraded ecosystems, and promote the recovery of threatened species.²²⁵ Further, parties must promote and encourage research that contributes to the conservation and sustainable use of biological diversity.²²⁶

The preamble of the *Convention on Biological Diversity* also incorporates the precautionary principle, discussed below.²²⁷

Other international fisheries instruments

In 1995, the 28th session of the UN Food and Agricultural Organization Conference adopted the *Code of Conduct for Responsible Fisheries* (FAO Code of Conduct).²²⁸ Canada supported its adoption.²²⁹ As stated in Article 1 of the FAO Code of Conduct, it is a voluntary code. However, some of its provisions are also found in international agreements such as the UNCLOS and the FAO Compliance Agreement, discussed above.²³⁰

The FAO Code of Conduct provides principles and standards applicable to the conservation, management, and development of all fisheries, including the capture, processing, and trade of fish and fishery products, fishery operations, aquaculture, fisheries research, and the integration of fisheries into coastal area management.²³¹ The objectives of the code include, among other things, establishing principles for responsible fishing, serving as a reference document for improving the legal framework for responsible fisheries, and providing standards of conduct for fisheries.²³²

General principles set out in the FAO Code of Conduct include the following:

- states should conserve aquatic ecosystems;
- fisheries management should promote the quality, diversity, and availability of fishery resources;
- states should prevent overfishing;
- fisheries management decisions should be based on the best scientific evidence available (taking into account traditional knowledge); and
- states and fisheries organizations should take into account the precautionary approach.²³³

The code also states that all critical fisheries habitats in marine and freshwater ecosystems should be protected and rehabilitated as far as possible and where necessary.²³⁴

The precautionary principle

The precautionary principle, sometimes referred to as the precautionary approach, appears in the United Nations Conference on Environment and Development's 1992 *Rio Declaration on Environment and Development* (Rio Declaration):

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.²³⁵

Following the Rio Declaration, articulations of the precautionary principle have appeared in international agreements to which Canada is a party. The *Convention on Biological Diversity* notes in its preamble that, "where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat."²³⁶ In *Environmental Defence Canada v. Canada (Minister of Fisheries and Oceans)* the Federal Court noted that, having ratified the *Convention on Biological Diversity*, Canada "is committed to apply its principles," and "an important feature of the *Convention* is the 'precautionary principle.'"²³⁷

The precautionary principle is also found in the 1995 *United Nations Agreement Relating to the Conservation and Management of Straddling Fish Stocks and Migratory Fish Stocks* (UNFA).²³⁸ The UNFA came into force in November 2001 and Canada is a party.²³⁹ Although the UNFA does not apply to anadromous fish stocks, such as Fraser River sockeye,* it provides an example of the precautionary principle in another fisheries context:

* The UNFA applies to straddling fish stocks and highly migratory fish stocks as interpreted in the context of the UNCLOS (PPR 2, International Law, p. 45).

States shall apply the precautionary approach widely to conservation, management and exploitation of straddling fish stocks and highly migratory fish stocks in order to protect the living marine resources and preserve the marine environment.

States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of scientific information shall not be used as a reason for postponing or failing to take conservation and management measures.²⁴⁰

In 2001, the Supreme Court of Canada observed that “scholars have documented the precautionary principle’s inclusion ‘in virtually every recently adopted treaty and policy document related to the protection and preservation of the environment’” and that “there may be ‘currently sufficient state practice to allow a good argument that the precautionary principle is a principle of customary international law.’”²⁴¹ Principles of customary international law are a source of international law that can create state obligations outside treaties.²⁴² Canada’s position

in this Inquiry is that the precautionary principle is not an established principle of customary international law.²⁴³

Whether it is or is not a principle of customary international law, Canada has expressed its commitment to the precautionary principle in several pieces of domestic legislation* relevant to the management and conservation of Fraser River sockeye. These include the *Oceans Act*, the *Canadian Environmental Protection Act*, the *Canadian Environmental Assessment Act*, and the *Species at Risk Act*.²⁴⁴ Canada has also incorporated the precautionary principle (or precautionary approach) into various relevant policies, action plans, and strategies, including the Wild Salmon Policy, the 2002 Aquaculture Policy Framework, DFO’s 2005–10 *Strategic Plan: Our Waters, Our Future*, the Federal Sustainable Development Strategy, Canada’s Framework for Science and Technology Advice, the 2005 Oceans Action Plan, and the Sustainable Fisheries Framework, among others.²⁴⁵ I am satisfied that the precautionary principle serves as an important guide in my consideration of the management and conservation of Fraser River sockeye.

Notes

- 1 Policy and practice reports were prepared by Commission counsel and entered into evidence to provide a contextual background to inform the hearings on the various topics, including: PPR 1, Aboriginal and Treaty Rights; PPR 2, International Law; PPR 3, Legislative Framework; and PPR 4, Pacific Salmon Treaty.
- 2 *Reference re British North America Act*, 1867, s. 108 (Can.), [1898] J.C.J. 1.
- 3 British Columbia Terms of Union, RSC 1985, App. II, No. 10.
- 4 *Comeau’s Sea Foods Ltd. v. Canada (Minister of Fisheries and Oceans)*, [1997] 1 SCR 12, para. 37.
- 5 *Constitution Act*, 1867, para. 11.
- 6 *Ward v. Canada (Attorney General)*, [2002] 1 SCR 569, para. 34.
- 7 *R. v. Nikal*, [1996] 1 SCR 1013, para. 102.
- 8 *R. v. Marshall*, [1999] 3 SCR 533, para. 40.
- 9 *R. v. Sparrow*, [1990] 1 SCR 1075, para. 81.
- 10 *R. v. Gladstone*, [1996] 2 SCR 723, para. 65.
- 11 *The Queen v. Robertson*, [1882], 6 SCR 52, paras. 120–21.
- 12 *Interprovincial Co-Operatives Ltd. v. The Queen*, [1976] 1 SCR 477, p. 495.
- 13 *Ward v. Canada (Attorney-General)*, [2002] 1 SCR 569, para. 40.
- 14 *Ward v. Canada (Attorney-General)*, [2002] 1 SCR 569, para. 43.
- 15 *Jack v. The Queen*, (1980) 1 SCR 294, para. 313.
- 16 *R. v. Sparrow*, [1990] 1 SCR 1075, para. 78.

- 17 Exhibit 1135.
- 18 Transcript, June 27, 2011, pp. 1–3; see also Exhibit 1134.
- 19 Douglas Harris, Transcript, June 27, 2011, pp. 3–4.
- 20 Douglas Harris, Transcript, June 27, 2011, p. 86.
- 21 Exhibit 1135, pp. 11–12, 16.
- 22 Exhibit 1135, pp. 16–18.
- 23 Transcript, June 27, 2011, pp. 55, 61.
- 24 Exhibit 1135, pp. 4–8.
- 25 Exhibit 1135, p. 4.
- 26 Exhibit 1135, p. 4.
- 27 Transcript, June 27, 2011, p. 23.
- 28 Douglas Harris, Transcript, June 27, 2011, pp. 9, 15, 23.
- 29 Exhibit 1135, p. 25.
- 30 Exhibit 1135, p. 26.
- 31 Transcript, June 27, p. 115.
- 32 First Nations Coalition’s written submission, p. 7, available at www.cohencommision.ca.
- 33 *Lax Kw’alaams Indian Band v. Canada (Attorney General)*, 2011 SCC 56, para. 72.
- 34 *Constitution Act*, 1982, being Schedule B to the *Canada Act 1982* (UK), 1982, c. 11.
- 35 *R. v. Van der Peet*, [1996] 2 SCR 507, para. 30.
- 36 *R. v. Sappier*; *R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, paras. 26, 33.

* Note the Supreme Court of Canada also observed that the precautionary principle had been “codified in several items of domestic legislation” (*114957 Ltée (Spraytech, Société d’arrosage) v. Hudson (Town)*, 2001 SCC 40, para. 31).

- 37 *R. v. Gladstone*, [1996] 2 SCR 723, para. 65.
- 38 *R. v. Van der Peet*, [1996] 2 SCR 507, para. 46.
- 39 *Lax Kw'alaams Indian Band v. Canada (Attorney General)*, 2011 SCC 56, para. 12.
- 40 *R. v. Sappier; R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, para. 21.
- 41 *R. v. Sappier; R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, para. 37; see also *Ahousaht Indian Band and Nation v. Canada (Attorney General)*, 2009 BCSC 1494, para. 482.
- 42 *R. v. Sappier; R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, paras. 50–51.
- 43 *R. v. Van der Peet*, [1996] 2 SCR 507, para. 55.
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- 49 *R. v. Van der Peet*, [1996] 2 SCR 507, para. 71; see also *R. v. Sappier; R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, para. 45.
- 50 *R. v. Sappier; R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, para. 26.
- 51 *R. v. Sappier; R. v. Gray*, [2006] 2 SCR 686, 2006 SCC 54, para. 26.
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- 56 *R. v. Sparrow*, [1990] 1 SCR 1075, para. 40.
- 57 *R. v. Sparrow*, [1990] 1 SCR 1075, para. 78.
- 58 *R. v. Sparrow*, [1990] 1 SCR 1075, para. 78.
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- 62 First Nations Coalition's final written submissions, pp. 12–13, available at www.cohencommission.ca.
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- 65 *Ahousaht Indian Band and Nation v. Canada (Attorney General)*, 2011 BCCA 237.
- 66 *Ahousaht Indian Band and Nation v. Canada (Attorney General)*, 2011 BCCA 23, basis for application for leave to appeal to SCC remanded to BCCA, 34387 (March 29, 2012).
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- 68 *R. v. Van der Peet*, [1996] 2 SCR 507, para. 91.
- 69 *R. v. N.T.C. Smokehouse*, [1996] 2 SCR 672, para. 26.
- 70 *Lax Kw'alaams Indian Band v. Canada (Attorney General)*, 2011 SCC 56.
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- 72 *R. v. Billy*, 2006 BCPC 48, para. 51.
- 73 *R. v. Gladstone*, [1996] 2 SCR 723, para. 57.
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- 102 *Comeau's Sea Foods Ltd. v. Canada (Minister of Fisheries and Oceans)*, [1997] 1 SCR 12.
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- 138 *Canada Water Act*, RSC 1985, c. C-11, s. 11.
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- 140 *Health of Animals Act*, SC 1990 c. 21, s. 2.
- 141 Exhibit 2128, p. 1.
- 142 *Reportable Diseases Regulation*, SOR/91-2.
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- 222 Exhibit 13, Article 7.
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Chapter 4 • DFO overview: organization, science, policies

This chapter provides an overview of the management structure and organization of the Department of Fisheries and Oceans (DFO), both nationally and regionally, as well as an introduction to its governance structure and budget. In addition to this general overview, I have provided in this chapter a more detailed discussion of the organization and management of DFO's science programs, as well as a discussion of some of its policies relevant to my Terms of Reference.

To an outsider, DFO's elaborate organizational structure rarely seems obvious or intuitive. The structure seems to change regularly, reflecting shifts in DFO's priorities; for example, during the life of this Commission, DFO's national science sector was renamed twice, from "Science," to "Oceans and Science" for 2010 and most of 2011, and to "Ecosystems, Oceans, and Science" in late 2011.

To understand how DFO manages the Fraser River sockeye salmon fishery and to make meaningful recommendations for changes to improve the fishery's sustainability, it is important

to understand how DFO works. The aim of this chapter is to describe its organizational structure, including its management of science, and some of the policies that guide it.

■ National and regional structure and organization

Like all federal government departments, DFO follows the administrative and financial policies established by the Treasury Board of Canada Secretariat (Treasury Board). It requires that all departmental reporting conform to its Policy on Management, Resources, and Results Structure, which contains three elements:

- "clearly defined and measurable strategic outcomes ...";
- a "program activity architecture ... that is explained in sufficient detail to reflect how a department allocates and manages its [human

and financial] resources to achieve their intended results”; and

- a “description of the current governance structure, which outlines the decision-making mechanisms, responsibilities and accountabilities of the department.”¹

The Treasury Board measures the performance of departments using its Management Accountability Framework² and issues reports reflecting its assessment of the department.³ DFO’s current deputy minister, Claire Dansereau, described the Management Accountability Framework as an extremely important document and the “basic management tool,” since it is a tool used by the clerk of the privy council to measure the performance of deputy ministers.⁴

DFO reports annually to Parliament, tabling the following documents for approval in the format prescribed by the Treasury Board, which are posted on DFO’s public website:

- Report on Plans and Priorities;
- Departmental Performance Report; and
- Departmental Plan.⁵

Ms. Dansereau described these three documents as “fundamental planning documents” for DFO, stating that the department organizes its human and financial resources around a set of strategic outcomes, identified in the annual Report on Plans and Priorities.⁶ This report summarizes the department’s plans for the coming year, setting out its “priorities and the key strategies for achieving them.”⁷ The Departmental Performance Report, in contrast, reviews the department’s performance over the previous year.⁸ DFO’s sectors and regions (described below) prepare business plans for the coming 12 months, as well as outlining the human and financial resources required. “The *Departmental Plan* takes the priorities set out in the [*Report on Plans and Priorities*] and the human resource implications outlined in the individual business plans and integrates them into a high-level summary of Department-wide and priority-specific challenges, as well as the strategies for addressing them.”⁹

Strategic outcomes and program activity architecture

DFO’s programs are organized to correspond with one of the stated strategic outcomes, creating the department’s “program activity architecture” in compliance with Treasury Board reporting requirements and as illustrated in DFO’s Report on Plans and Priorities. The deputy minister said that DFO’s priorities “flow from a series of higher level statements made by the Prime Minister ... [including] from the speech from the throne ... [and] from the budget documents.”¹⁰

DFO has established three strategic outcomes (adhering to the Treasury Board’s structure), which are currently set out in the *Report on Plans and Priorities, 2011–2012*, as follows:

- economically prosperous maritime sectors and fisheries;
- sustainable aquatic ecosystems; and
- safe and secure waters.¹¹

Prior to 2011–12, DFO’s three strategic outcomes were stated as follows:

- safe and accessible waterways;
- sustainable fisheries and aquaculture; and
- healthy and productive aquatic ecosystems.¹²

Figures 1.4.1 and 1.4.2 illustrate the programs and underlying activities for the relevant strategic outcomes, as set out in the *DFO Report on Plans and Priorities, 2010–2011*, and *2011–2012*, respectively.

DFO organizational structure – the functional matrix model

The organizational structure of DFO is complex, with both national and regional offices responsible for integrated programs and policies operating as a “functional matrix,” described below. DFO has six regional centres of operations: Pacific, Central and Arctic, Quebec, Gulf, Maritimes, and Newfoundland

2010-11 Program Activity Architecture

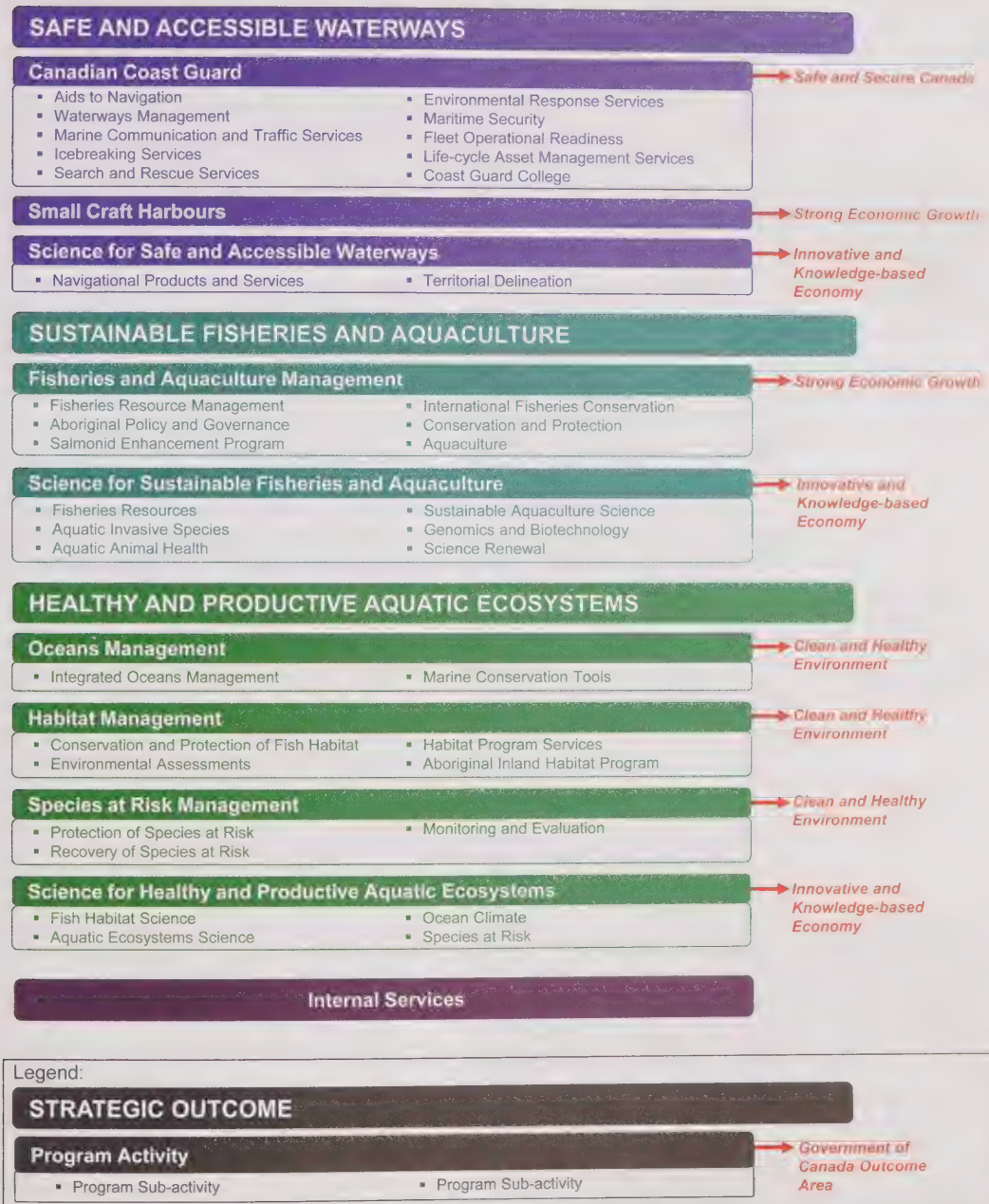


Figure 1.4.1 Strategic outcomes and program activities, 2010-2011

Source: DFO, Report on Plans and Priorities, 2010-2011.

2011-12 Program Activity Architecture

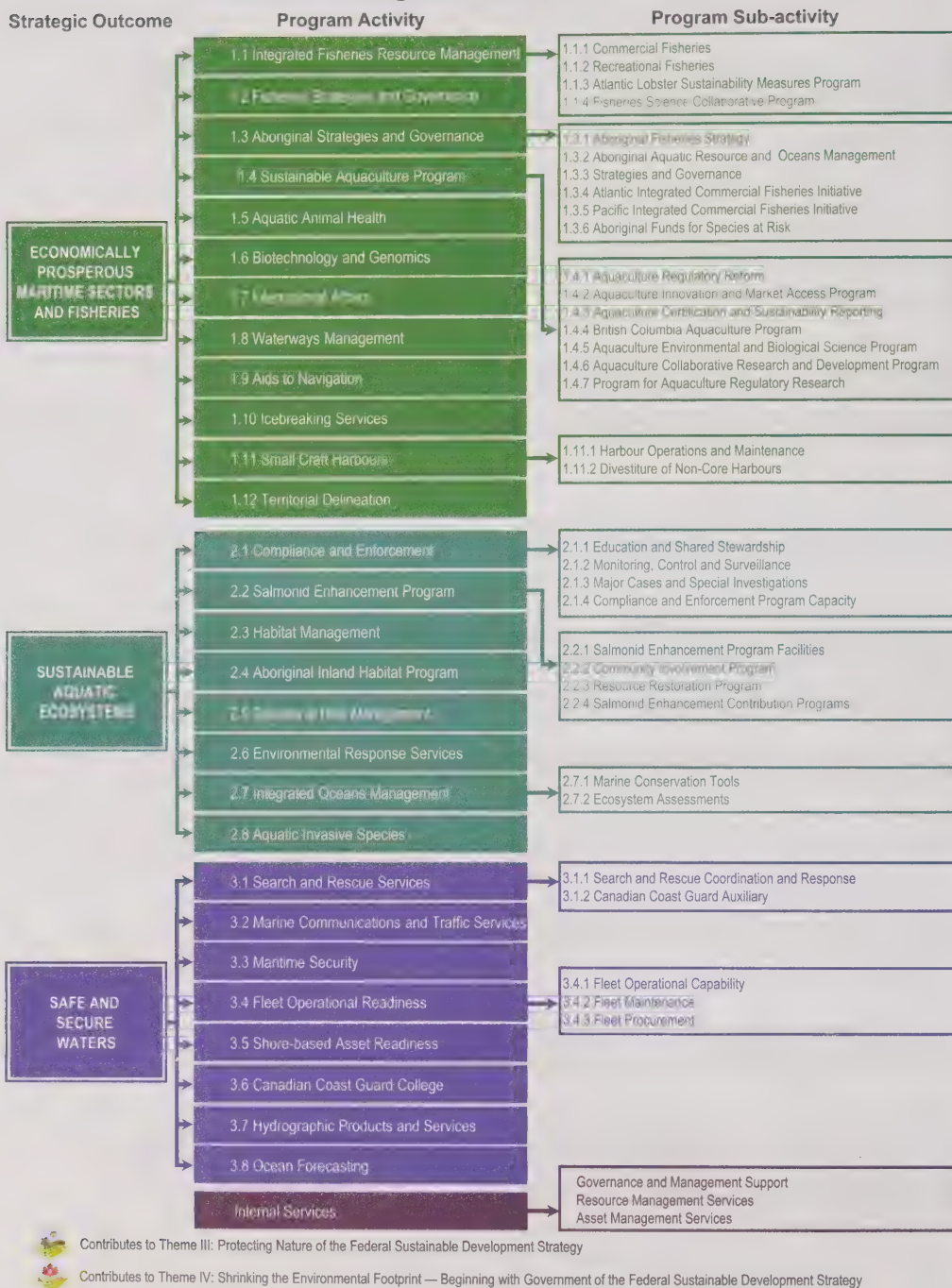


Figure 1.4.2 Strategic outcomes and program activities, 2011–2012

Source: DFO, *Report on Plans and Priorities, 2011–2012*.

and Labrador. More than 85 percent of DFO's resources are located in the six regions, three of which are located east of the province of Quebec. The Pacific Region encompasses all of British Columbia and the Yukon.

In emailed submissions, as well as during presentations at the forums held throughout the province in fall 2010, I was told that "many members of the public have lost confidence in DFO as presently constituted"¹³ and that there should be less "political interference" from Ottawa in the operations of DFO's Pacific Region offices.¹⁴ A presenter at the Prince Rupert public forum said:

Many people out there accuse mismanagement by DFO and their inability to effectively manage and protect salmon, DFO's lack of sufficient baseline research for such protection and their ineffective management regime seems to be high on the list. I believe that DFO is too centralized and that regional staff need the autonomy and flexibility to make decisions that make sense locally, decisions that can respond to fluctuations and changes.¹⁵

The minister of fisheries and oceans has overall responsibility for the management and direction of DFO under the *Department of Fisheries and Oceans Act* and oversees the administration of the *Fisheries Act* and other pertinent legislation. The prime minister appoints the deputy minister, who is the accounting officer and the most senior public servant in DFO; the deputy minister advises and provides the minister with the necessary support to fulfill his or her responsibilities. The deputy minister is responsible for the day-to-day management of DFO, assisted by an associate deputy minister. DFO encompasses the Canadian Coast Guard, a special operating agency, whose commissioner reports to the deputy minister.

In the functional matrix organizational chart, there are national "sectors" headed by assistant deputy ministers (ADMs) who report directly to the deputy minister. DFO's six regions are headed by regional directors general (RDGs), who also report directly to the deputy minister. During this Inquiry, DFO restructured its Ottawa headquarters and renamed several of its sectors. The national sectors are currently:

- Ecosystems and Fisheries Management (which has both a senior ADM and an associate ADM) (formerly Fisheries and Aquaculture Management);
- Ecosystems and Oceans Science;
- Programs (formerly Habitat and Species at Risk);
- Strategic Policy (formerly Policy); and
- Human Resources and Corporate Services.¹⁶

In the national sectors, directors general report to the respective ADM and are in charge of various activities or programs (some of which are unique directorates). In the Ecosystems and Fisheries Management sector are areas of responsibility such as Aboriginal Programs and Governance, Conservation and Protection, and Ecosystem Management, which are related to the regional branches. Under the Programs sector are Fisheries and Aboriginal Policy and Aquaculture Management. Figure 1.4.3 describes the national organizational structure, showing the positions that report to the deputy minister, which include the assistant deputy ministers and the regional directors general.

David Bevan, the current associate deputy minister and former senior ADM, Ecosystems and Fisheries Management, described the interaction in the functional matrix model:

We have a matrix management model, policy and program directions set by the Minister based on advice provided through the Deputy Minister from the Department, and then implementation and program delivery are undertaken in the regions ... The sectors are headed by the ADMs so they are the ones responsible for program design in conjunction with regions, as well as the policies that guide the operations ... The intention here was ... to provide policy cohesion and ... an operational nimbleness in the regional operations so that they are able to tailor their operational realities to their socioeconomic differences and to the geographical and biological realities that they face.

The model includes both functional and line reporting relationships. Functional reporting ensures coordination and consistency that's done both at the Ottawa level and in the regional operations. And line authority ensures direct accountability for day-to-day decision making.



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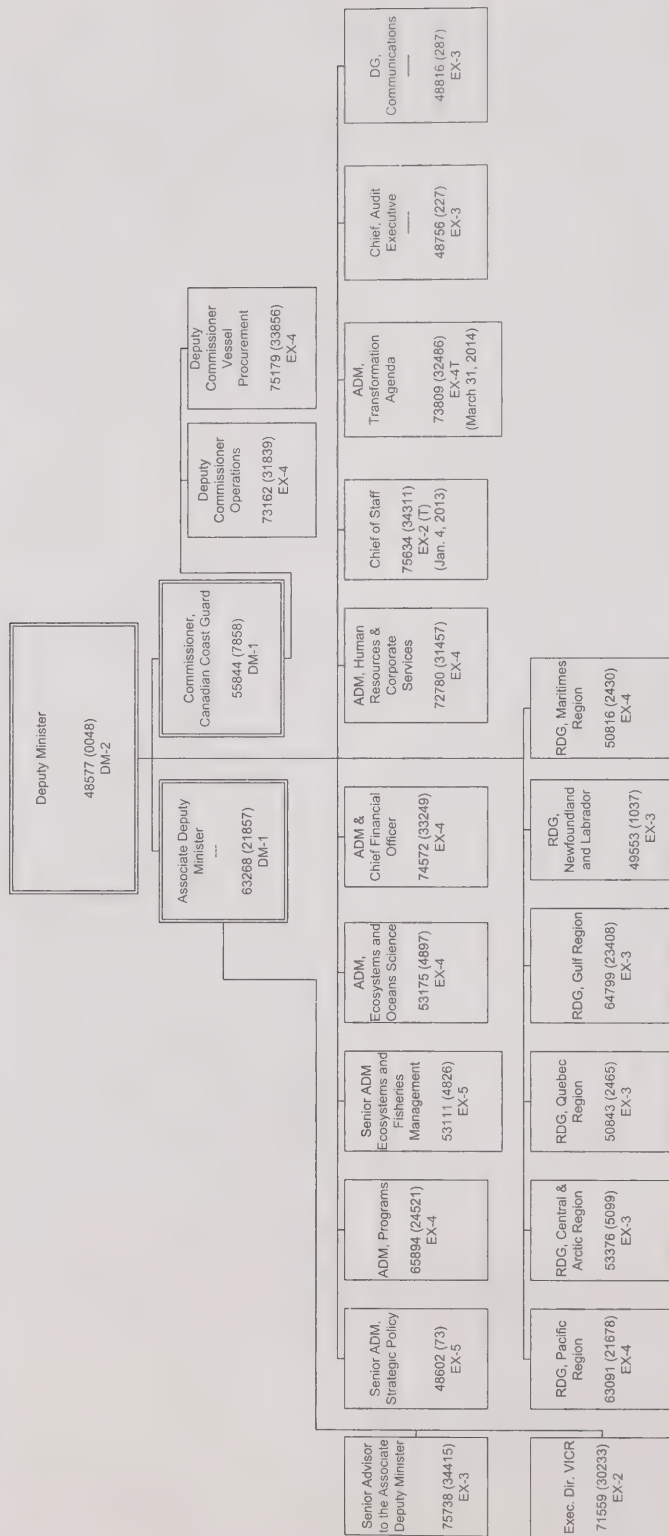


Figure 1.4.3 Department of Fisheries and Oceans organizational chart

Source: DFO 2012.

The RDGs ... are responsible for delivering programs and activities in their regions in accordance with national and regional priorities, and within assigned resources and national performance parameters ... They receive resources ... through the [Departmental Management Committee] decision-making process from Ottawa, and Ottawa, of course, receives them from Parliament through the budget process. And they are responsible for achieving results from the use of those resources and delivering the outputs and outcomes in accordance with the program design, and demonstrating that through performance measurement.¹⁷

In the Pacific Region, there are “branches” headed by regional directors and “area offices” headed by area directors, all of whom report directly to the RDG Pacific. The six regional directors in the Pacific Region oversee the following branches:

- Fisheries and Aquaculture Management;
- Science;
- Ecosystem Management (formerly Oceans, Habitat, and Enhancement);
- Policy and Economic Analysis;
- Conservation and Protection; and
- Communications.¹⁸

The regional directors are responsible for the overall delivery of specific programs within the region, including providing direction and coordinating program delivery across the province, as well as managing the program’s budget. Unique to the Pacific Region, the regional director of the Conservation and Protection Branch (which includes the fishery officers) reports directly to the RDG Pacific (see Chapter 7, Enforcement). In other regions, conservation and protection falls under the Fisheries and Aquaculture Management Branch.¹⁹

Similar to the national sectors, Pacific Region’s branches also encompass various activities and programs, which are headed by directors. The Fisheries and Aquaculture Management Branch includes aquaculture management (headed by its own director, who reports to the regional director, Fisheries

and Aquaculture Management); the Salmon Team (which is headed by a lead); and Treaty and Aboriginal Policy (headed by its own regional director, who reports to the regional director, Fisheries and Aquaculture Management, as opposed to the RDG). The division head of Salmon and Freshwater Ecosystems (SAFE) is located in the Science Branch.

There are five area directors who, are responsible for delivery of programs in their areas: the Lower Fraser River, North Coast, Yukon Transboundary Rivers, BC Interior, and South Coast. Figure 1.4.4 illustrates the organizational structure of DFO’s Pacific Region.

Regional directors in the Pacific Region have both a line and a functional reporting structure involving regional and national management, whereas area directors report to senior regional management. Paul Macgillivray, associate RDG Pacific, described this reporting structure as follows:

While the regional program directors ... have a line reporting relationship with the [RDG], they also report functionally to [ADMs]. So for example, the regional director of Science reports to the [RDG], [and] also reports functionally to the [ADM] of Oceans and Science and is responsible for the delivery of the science program throughout Pacific Region.

Area directors are responsible for local delivery of most of the major programs within their geographic area and managing area staff. Area directors and their staff receive program direction from the regional program directors.²⁰

National and regional governance models and setting DFO priorities

The national Departmental Management Committee* is chaired by the deputy minister, and all the ADMs and RDGs, as well as key directors general from the national sectors, sit on the committee. It is DFO’s senior management decision-making body and is responsible for establishing overall goals, policies and procedures, and priorities for the department, as well as preparing ministerial briefings. The

* In 2011, the Departmental Management Committee was renamed the Departmental Management Board (Claire Dansereau, Transcript, September 22, 2011, p. 45). For the purposes of this Report, it will be referred to as the Departmental Management Committee.

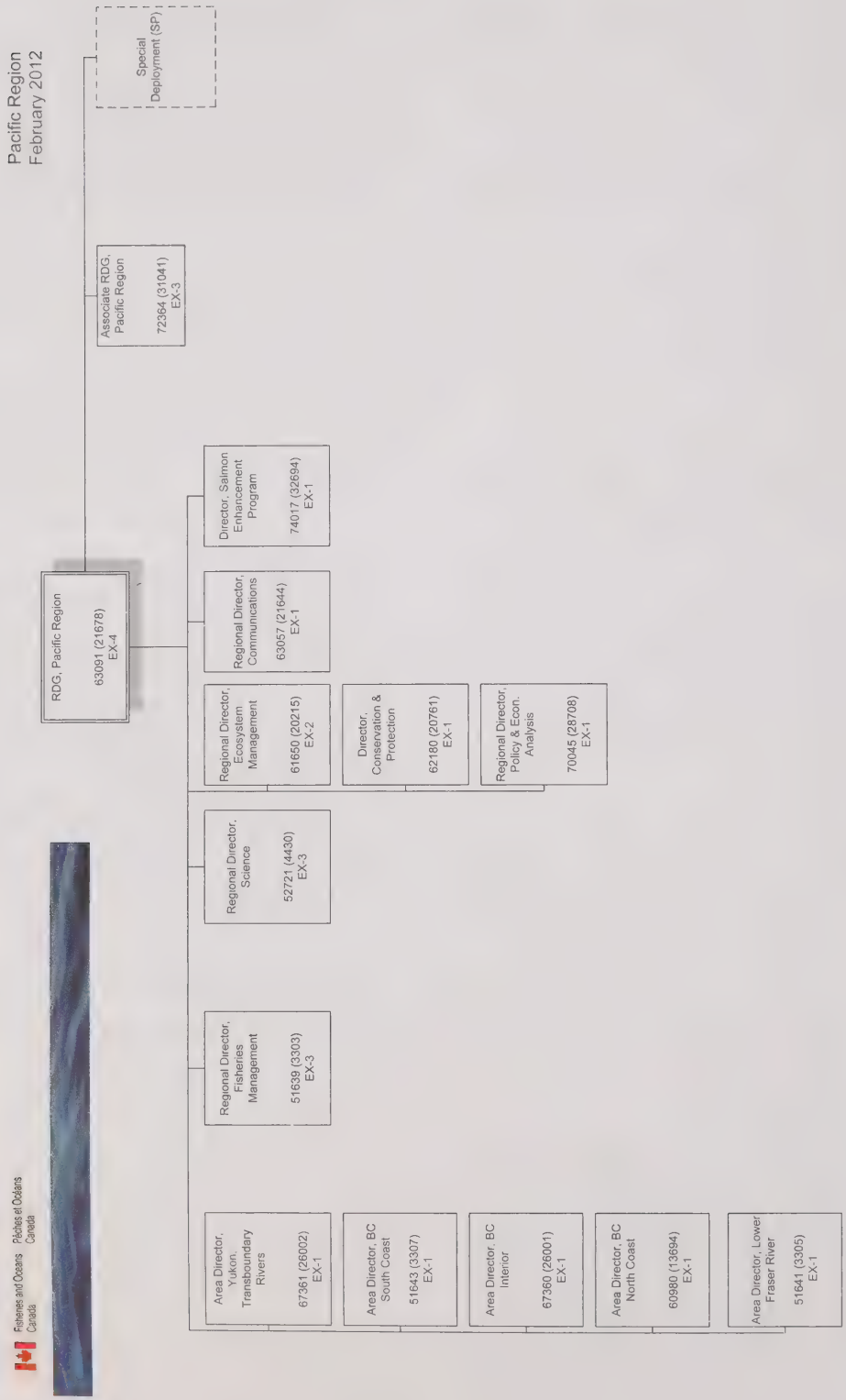


Figure 1.4.4 Department of Fisheries and Oceans, Pacific Region, organizational structure

Source: DFO 2012.

Departmental Management Committee is supported by a group of subcommittees:

- the science management board;
- the human resources subcommittee;
- the legal risk management committee;
- the finance subcommittee;
- the information management board; and
- the departmental evaluation committee.²¹

The Departmental Management Committee meets weekly by teleconference for regular management matters and approximately every two months in person. It also meets annually (typically in September) to establish DFO's priorities for the coming year; and these priorities and the key strategies for achieving them are then set out in the Report on Plans and Priorities.²² The committee also reviews and approves the business plans prepared annually by the sectors and the regions.²³

In the Pacific Region, the six regional directors and five area directors sit on the Regional Management Committee – together with the RDG, who chairs it. The Regional Management Committee serves a similar management function to the national committee. It meets every two weeks and is supported by several subcommittees.

Among the subcommittees that report to the Regional Management Committee are the operations and the strategic directions committees, two subcommittees initially created to deal with the implementation of the Wild Salmon Policy (WSP – see Appendix B).²⁴ The operations committee deals with “day-to-day” issues; according to Mr. Macgillivray, it serves as the Pacific Region’s “principal forum for monitoring progress and providing direction on the implementation of key cross-sectoral initiatives.”²⁵ The strategic directions committee, in contrast, provides long-term direction on Pacific Region issues. According to Paul Sprout, former RDG, Pacific Region, it “deals with issues that are in early stages that typically require a concerted effort over a long period of time to develop responses to.”²⁶

DFO sets its priorities through the Departmental and Regional Management committees in a process described by the deputy minister as follows:

We really have a top-down bottom-up and lateral process for setting our priorities ... pri-

orities are set in the region depending on regional priorities. Those are fed into a national process. But at the same time we receive priorities from the Prime Minister and from the Minister of Finance through either the Speech from the Throne or from the budget process ... At the same time though, priorities come from the ground ... through various processes where it's clear that our stakeholders are unhappy with a policy suite or we feel from a science perspective that some objectives are not being met and so there's a constant iterative setting of priorities, however our general direction, it doesn't change all that much over time ... our mandate is very clear and the priorities can simply shift within the mandate.²⁷

Susan Farlinger, current RDG, Pacific Region, described the regional process as follows:

Priorities are set in much the same way a level down. We understand the Government of Canada priorities that come to us through a set of departmental priorities. At the same time, we're putting together the contextual and scan information of the situation here in Pacific Region that would make one item a particular priority in a particular year and then we factor at the Regional Management Committee those priorities that we understand from the context of issues and challenges that are going on in the region into the departmental priorities that we have from the Departmental Management Committee to arrive then at a set of regional priorities, which is a subset of the departmental priorities.²⁸

The deputy minister told me that, at the national level, the people, positions, and programs that are of particular relevance to Fraser River sockeye are the senior ADM and associate ADM, Ecosystems and Fisheries Management; the ADM, Science; and the chief financial officer.²⁹

Ms. Farlinger identified the following key positions at the regional level with responsibility for Fraser River sockeye: the RDG; three of the area directors (BC Interior, South Coast, and Lower Fraser River); the regional directors of Fisheries and Aquaculture Management; Oceans, Habitat,

and Enhancement; Science; and Conservation and Protection; as well as the director of special projects. The RDG also indicated that the regional directors of Policy and Economic Analysis and of Communications play supporting roles.³⁰

DFO budget

DFO's budget is determined at the national level and is made up of funding for ongoing core operations, referred to as A-based funding, as well as limited-term funding dedicated to specific programs, known as B-based funding.³¹ The deputy minister testified that the 2011/12 annual budget for DFO is \$1.82 billion.³² The RDG Pacific testified that the annual expenditure for 2009/10 for the Pacific Region was approximately \$404 million: \$271 million allocated to DFO activities, and \$134 million to Coast Guard activities. In 2010/11, DFO's Pacific Region expenditures were similar: approximately \$284 million on DFO activities, and \$126 million on Coast Guard activities.³³

DFO generally allocates its budget by program, so it is difficult for the department to identify the funds it allocates to the management of Fraser River sockeye on an annual basis. DFO estimates that at least \$50 million per year is spent in managing salmon and that, for the years from 2005/6 through 2009/10, it spent between \$17.9 and \$23.3 million on Fraser River sockeye. For 2010/11, the department estimates that the base number of \$64 million was spent on salmon directly (but that does not take into account portions of programs not attributed specifically to Pacific salmon).³⁴

Throughout the hearings, I learned that many of DFO's programs are funded through limited term, B-based funds. For example, the Pacific Integrated Commercial Fisheries Initiative (PICFI), which was to expire in 2012 but has been extended at least through 2012/13,* funds some catch-monitoring programs (in addition to other things); test-fishing programs have been funded through "Larocque relief funding," which was to expire at the end of

2011;† and scientific research projects are funded through B-based funds.³⁵ Witnesses expressed concern that B-based funding for programs expires (or "sunset") before DFO has assessed the merits of the program and/or committed ongoing funding for it.³⁶ The deputy minister defended the use of B-based funding:

[W]e've heard a few times this morning the idea that because something is sunseting it will disappear. And the approach of sunseting and [B-based] money, I realize that for some people in the bureaucracy it's nervous-making for them, that programs are time limited.

But, in fact, what time limited money does is ensure that at a certain point there is a serious evaluation of the usefulness, the utility of all the elements of that program, and if they're no longer useful, they should stop being done.

So it's almost a mini strategic review of each program as it reaches its end point. Some are truly designed to be five-year programs and come to an end; others are designed to be reviewed and for us to go and seek additional funds to either continue – discontinue some parts or continue some others. So we have no position, at this table, at this point, that the money is either going to be there or not be there.³⁷

A-based funding is subject to reductions in government spending through strategic review, which is a process mandated through the Treasury Board requiring government departments to review all program spending on a four-year cycle and to identify 5 percent of program spending to be reallocated from "lower-performing, lower-priority" programs to other Government of Canada priorities.³⁸ In 2010, DFO was subject to a strategic review. The deputy minister testified that this strategic review resulted in a budget reduction of \$56.8 million, or approximately 3 percent of DFO's budget, and that this reduction will be implemented over three years (2010–12).³⁹

DFO is also subject to an additional reduction in its budget as part of a government-wide strategic

* Canada's 2012 Economic Action Plan: Jobs, Growth and Long-term Prosperity, tabled in the House of Commons on March 29, 2012, proposes \$33.5 million to DFO for AICFI and PICFI (p. 150) (see www.budget.gc.ca).

† I note that Part 4, Division 18, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which received royal assent on June 29, 2012, amends the *Fisheries Act* by adding a new section 10, "fish allocation for financing purposes," which is directly relevant to test-fishing funding (see discussion of test fishing in Chapter 5, Sockeye fishery management).

and operational review, the Deficit Reduction Action Plan.⁴⁰ The deputy minister testified that the deficit reduction plan will result in a 5–10 percent reduction of DFO's budget over the years 2012–15.⁴¹ The 2012/13 budget directs a 5.8 percent reduction.⁴² These reductions will affect DFO's A-based funded operations.

DFO's working relationships

As stated in the Pacific Region's 2010–11 business plan, "The Pacific Region would not be able to achieve its interests without developing and maintaining strong relationships and collaboration with key partners, organizations, and governments that engage in fisheries planning, allocation planning and scientific cooperation[.]"⁴³

As described in Chapter 3, Legal framework, the Pacific Salmon Treaty requires that Canada (DFO) work with the United States in managing the fishery in the designated geographic area assigned to the Fraser River Panel. The relationship between DFO and the Pacific Salmon Commission and Fraser River Panel in the management of the fishery is explained in greater detail in chapters 5, Sockeye fishery management, and 8, Salmon farm management.

DFO representatives sit on the North Pacific Anadromous Fish Commission, an international commission established under the 1992 *Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean* (sockeye are anadromous fish) whose member states are Canada, Japan, South Korea, Russia, and the United States. DFO is also involved with the North Pacific Marine Science Organization (PICES), an intergovernmental scientific organization established to promote and coordinate marine research in the northern North Pacific Ocean. Member states are Canada, Japan, China, South Korea, Russia, and the United States.

The Government of Canada has constitutional authority for seacoast and inland fisheries. The Government of British Columbia has authority over property and civil rights in the province. Thus DFO (as the federal agency) must work together with provincial ministries, particularly in the management

of fish habitat.* Canada and British Columbia often use a memorandum of understanding (MOU) or letter of agreement to set out their respective responsibilities and describe their working relationship. Several of DFO's agreements with British Columbia are described in Chapter 6, Habitat management.

DFO is also involved with British Columbia's municipalities and regional districts. The department is a party to an agreement regarding the implementation of British Columbia's *Riparian Areas Regulation* (RAR) and participates in the Shuswap Lake Integrated Planning Process (SLIPP), which involves regional districts, municipalities, First Nations, and the province (the agreement and SLIPP are discussed in detail in Chapter 6, Habitat management).

As well, DFO works with other federal government departments, primarily Environment Canada, but also Transport Canada, Parks Canada, and Indian and Northern Affairs. Although the minister of fisheries and oceans is responsible for the implementation of the *Fisheries Act*, Environment Canada is responsible for the administration of section 36 of the *Fisheries Act*. The relationship between DFO and Environment Canada and the role of Environment Canada regarding fish habitat are explained in chapters 6, Habitat management, and 7, Enforcement.

As discussed in Chapter 5, Sockeye fishery management, DFO also works with individual First Nations and Aboriginal fishing organizations.

■ National and regional organization of DFO Science

During the hearings, many issues were raised regarding DFO's use of science and the interaction between DFO management and its scientists in managing the fishery. The following section describes the organization of DFO Science, providing background and context for my analyses, findings, and recommendations set out in Volume 3 of this Report.

I received public submissions stating that DFO Science is underfunded and lacks adequate human

* I note that Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. In Part 3, Division 5, Bill C-38 contains proposed amendments to the *Fisheries Act*, creating new sections 4.1–4.4. These sections afford the minister the authority to enter into agreements with the provinces and others to further the purposes of the *Fisheries Act* and to implement programs and projects for the purposes of the Act. I discuss the implications of Bill C-38 in Volume 3, Chapter 3, Legislative amendments.

resources.⁴⁴ I also heard from the public that DFO's scientists should be more independent of DFO; that they should not be "muzzled" but should be free to discuss their research with the public; and that an independent science advisory board should be encouraged.⁴⁵ In its public submission, the Pacific Fisheries Resource Conservation Council urged me to endorse its January 2010 advisory report calling for a "new science strategy and a transition to ecosystem-based management to support a comprehensive salmon sustainability strategy."⁴⁶

In one public submission, the writer attached an article (later tendered as an exhibit during the hearings), "Is scientific inquiry incompatible with government information control?"⁴⁷ This 1997 article focused on the collapse of the Atlantic cod fishery and the Kemano Hydroelectric Project in British Columbia. The authors, who included witness Dr. Carl Walters, a professor at UBC Fisheries Centre, criticized DFO's fisheries science:

The present framework for linking science with management can, and has, lead to abuses that threaten the ability of scientists to understand fully the causes of fish declines, to identify means of preventing fishery collapses from recurring, to incorporate scientific advice in management decisions, and to communicate research in a timely fashion to as wide an audience as possible. The existing framework of government-sponsored fisheries science needs to be replaced. It has failed to ensure viable fish resources and thereby sustain the fishing people and fishing communities upon which successful fisheries management depends.⁴⁸

Another public submitter, referring to this article, wrote:

Beyond the provision of knowledge, we need a structure that allows the public to know what the scientific findings and advice are. We need a structure that permits thoughtful public response and feed-back to such information.

If political people must over-ride science for reasons of "greater societal good," which they have every right to do, let them do so openly. Then let them also explain it openly, rather than trying to shape and manipulate science, through the bureaucracy, to serve political or business ends.⁴⁹

In her public submission, Ms. Vicky Husband, a well-known environmentalist, commented:

This inquiry cannot just be about science ... but it must be about how government responds and manages in the face of scientific information and traditional knowledge – knowing things is great, but it is what we do with that knowledge that matters.⁵⁰

DFO considers itself a "science department" – the deputy minister testified that science is critical for DFO's decision making.⁵¹ DFO witnesses stressed that the role of its scientists is not to recommend action to management, but to provide scientific advice on which management decisions may be based:

DFO Science does research based on the needs of management.⁵²

The role of Science is to provide the state of the science, and what is known about the issue, to management.⁵³

[T]he role of Science ... is not to recommend that we take action. The role of science ... is really to give a description of the state of the system as best as we know it, and ... it's the management arm of the Department whose role it is to then take that information and to then make any management-related decisions[.]⁵⁴

Science provides advice. Science provides risk frames and we at the senior level will determine what risks are tolerable and make recommendations on that. It is an iterative process throughout the Department.⁵⁵

[DFO Science provides] scientific advice, but that scientific advice needs to be grounded in the – in research and [in] factual evidence ... the scientific advice is only one piece of the advice that goes into the department, so it may or may not impact on any final decision that's taken in any particular situation ... [DFO Science's] role is to provide the scientific piece of the story which is then combined with other factors that would then influence a final decision.⁵⁶

I'm in Science Branch and our role is to give science-based advice to managers and to ensure that Science decisions are made on sound factual information. And that advice is hopefully considered by managers, along with social, political and economic factors in, ultimately, making management decisions.⁵⁷

What is the role of a government scientist? ... I think the number one thing is to provide sound advice to the government of the day. And to do that, I think in science, you want your scientists working at the edge ... [DFO scientists] do not make decisions on government priorities or Departmental priorities. Having said that, we do have mechanisms, briefing notes and discussions to inform our management about what we see as urgent issues.⁵⁸

Organization of DFO Science

DFO's functional matrix organization model is reflected in its Science staff. At the national level is the Science sector, headed by an ADM.* At the regional level, there is the Science Branch, headed by the regional director, Science. In the reporting structure, the regional director, Science, in Pacific Region has a line reporting relationship with the RDG Pacific, as well as a functional reporting relationship with the ADM, Science, in Ottawa.⁵⁹

DFO has approximately 1,700 employees in its Science sector, which includes 466 full-time employees working in the Pacific Region.⁶⁰ Of the Pacific Region's scientific employees, 55 are classified "scientist"; they are research scientists engaged in science work and possessing doctoral degrees (PhDs). There are also scientific employees classified as "biologists," all of whom have science degrees and some of whom have post graduate degrees in science, including PhDs. Dr. Laura Richards, the current Pacific regional director, Science, explained the distinction between the classifications of scientist and biologist:

[T]he scientists have a clear progression scheme, which is based on their ability to do research and the impact and influence of that research and the amount of innovation that

they're able to bring to the program, [whereas the biologists'] ... classification is determined by the job that management asked them to do.⁶¹

The Pacific Region's Science Branch employees also include scientific technicians who have specific technical expertise but may not have a degree in science.

In the Pacific Region, of the 466 full-time Science employees, approximately 120 work in the region's area offices under area directors, as opposed to in the Science Branch reporting to the regional director, Science.⁶² Dr. Richards described the work of these area Science staff as largely doing the programs on salmon stock assessment. She said that they are the "people who are out in the field collecting data on numbers of returning sockeye," as well as engaging in consultation processes.⁶³

Most Pacific Region scientists work within the Science Branch at DFO's four research laboratories in British Columbia: the Institute of Ocean Sciences in Sidney, the Pacific Biological Station in Nanaimo, the West Vancouver Laboratory, and the Cultus Lake Laboratory. In addition, some DFO scientists work at other sites (at the University of Victoria in the Centre for Climate Modelling and Analysis, and at the Cooperative Resource Management Institute at Simon Fraser University).⁶⁴

DFO Science renewal / reform

During her tenure as ADM, Science, Dr. Wendy Watson-Wright directed DFO Science through a "renewal program" in recognition of the increased demand for scientific advice in the department as a result of new legislation (*Canadian Environmental Assessment Act*, *Oceans Act*, and *Species at Risk Act*), coupled with the depletion of financial resources and attrition of the scientific staff.⁶⁵

According to Dr. Watson-Wright, through its renewal process DFO Science discovered that there was a lack of adequate priority-setting mechanisms, a lack of efficiency in delivering its programs, an accelerating loss of staff, and fairly severe funding pressures.⁶⁶ Dr. Watson-Wright also commented that "science was not that well understood by the other sectors who we were trying to serve, and by

* As mentioned earlier, it is now called the "Ecosystems, Oceans and Science" sector, but will be referred to as Science in this Report.

senior management.”⁶⁷ The objective of the science renewal work, as well as the approach set out in the documents resulting from the science renewal process, was to structure, focus, and prioritize the work being done by DFO Science.

The Science Management Board and setting priorities for science

In its first document in the renewal process, *Science at Fisheries and Oceans Canada: A Framework for the Future* (Framework for the Future), there is an assertion that DFO Science “needed to establish a transparent priority-setting process based on integrated risk management,”⁶⁸ which Dr. Watson-Wright explained as follows:

[Under] the transparent priority-setting process ... it was not so difficult to set priorities in conjunction with [fisheries management]. But with the *Oceans Act* and with the *Species at Risk Act* ... we had more clients, so we also had to service the *Species at Risk* program and the oceans program and any environmental programs, and we didn’t have a mechanism for having all the clients in the same room at the same time, or having some sort of a forum whereby all those who we were trying to serve would understand, you know, others had needs as well.
...

So that’s what we were attempting to put in place, and we began that with the establishment of the Science Management Board.

[A]cross the country we sat down with the science regions and in headquarters to determine, what are the greatest risks for science, and by “risks” we mean ... not being able to perform the science, not being able to serve clients’ needs, and all those sorts of things.⁶⁹

DFO Science’s Framework for the Future was the genesis for science renewal – the umbrella document that sets out DFO Science’s strategy in the context of four science “pillars”: relevant, effective, affordable, and valued.⁷⁰

As a result of the science renewal program, DFO established the Science Management Board in 2005. The membership of the board includes the deputy

minister; the ADM, Science; the ADM, Ecosystems and Fisheries Management; two RDGs (one from an eastern region and one from a western region, sitting for two-year terms); senior scientists (initially one, later increased to two); and the chair of the Science sector’s external science advisory council. As stated in the minutes of the first meeting of the Science Management Board, it “is responsible for identifying issues of importance to the achievement of the mandated objectives of the Department, selecting and assessing departmental and government-wide priorities needing science support, and providing strategic direction of the work planning of DFO Science.”⁷¹

Dr. Watson-Wright described the Science Management Board as a decision-making board, which “morphed into something that would then take things to the [Departmental Management Committee].”⁷² The Science Management Board is one of the subcommittees reporting to the Departmental Management Committee.⁷³ Mr. Bevan said that the board “looks at the broad directions for the science program, and that’s been a key body as we’ve tried to move from very precise counting of fish ... to a broader perspective.”⁷⁴ In Dr. Watson-Wright’s understanding, the Science Management Board was to meet twice per year, which it did during the process of science renewal.⁷⁵ However, it has not met since the fall of 2009 (with the departure of Dr. Watson-Wright and the appointment of Dr. Siddika Mithani as ADM in February 2010).⁷⁶

During the science renewal process, the Science Management Board produced a *Five-year Research Agenda, 2007–2012* (Research Agenda).⁷⁷ Dr. Watson-Wright testified that the Research Agenda was an attempt to improve the relationship, understanding, and communication between the Science sector, its client sectors, and senior management within DFO.⁷⁸ The Research Agenda contains the following 10 research priority areas, which reflect research that DFO Science considered essential to address Canada’s and DFO’s priorities for five years, starting in 2007:

- fish population and community productivity;
- habitat and population linkages;
- climate change / variability;
- ecosystem assessment and management strategies;

- aquatic invasive species;
- aquatic animal health;
- sustainability of aquaculture;
- ecosystem effects of energy production;
- operational oceanography; and
- emerging and enabling technologies for regulatory and policy responsibilities.⁷⁹

Dr. Watson-Wright told me that

[it] took a number of months to put [the Research Agenda] together. In the end, the very last draft went to every single person in science in the department ... And ultimately it was approved by the Science Management Board and by the Departmental Management Committee.⁸⁰

In conjunction with the Research Agenda, the Science Management Board also produced the *Five-year Research Plan (2008–2013)*⁸¹ (Research Plan).

This plan provides a rationale for *what* research is conducted in support of priority areas, especially ecosystem-based management, and *how* this research will be delivered to ensure federal and departmental priorities are addressed while accounting for regional differences. This living document will guide DFO Science through the next five years. Twenty initiatives are underway within DFO Science to ensure the department can deliver on priorities outlined in the *Five-Year Research Agenda*. It is expected that both the Research Agenda and this accompanying Research Plan will be revisited and revised accordingly in five years to ensure changing priorities are adequately addressed. Further, the twenty initiatives will require realignment of regional resources to ensure priorities are addressed.⁸² [Emphasis in original.]

According to DFO Science, the Research Plan is intended to implement the Research Agenda with the following 20 specific initiatives:

- seven ecosystem research initiatives
 - Newfoundland Shelf;
 - Gulf of Maine;
 - Northumberland Strait;

- Lower St. Lawrence Estuary;
- Lake Ontario;
- Beaufort Sea; and
- Strait of Georgia [discussed below].
- climate change science initiative
- 12 centres of expertise
 - aquatic animal health and research diagnostics;
 - aquatic biotechnology regulatory research;
 - aquatic risk assessment;
 - marine mammals;
 - environmental research on pesticides;
 - hydropower impacts on fish and fish habitat;
 - integrated aquaculture science;
 - ocean model development and application;
 - offshore oil, gas, and energy research;
 - aquatic chemical analysis;
 - arctic habitat research; and
 - aquatic habitat research.⁸³

Dr. Watson-Wright testified that the Research Agenda and Research Plan “seemed to be going well” when she left DFO in late 2009.⁸⁴ The current ADM, Science, Dr. Mithani, testified that DFO Science “will be working on these particular documents to see how we can refine them further[,]” but could not confirm that the Research Agenda and Research Plan were in the process of being formally revisited and revised as set out in the documents themselves.⁸⁵ Dr. Mithani testified that the priorities determined by the Science Management Board and set out in the Research Agenda required “tweaking,” and this fact explained why the board had not met since the fall of 2009. She stated:

What we now need to do is to go one step further, identify what the Science priorities need to be, to actually validate them and say is this where we still need to be? Has anything changed? Does it need tweaking?

So we haven’t met yet because what you need to do, from my perspective, is you have to be very clear on the kind of advice, recommendation that you would want from a Science Management Board. And at this point in time there’s work underway in looking at exactly what we would want to bring the Science Management Board for, and what kind of

advice we would want from that Board so that we can move forward.

[W]hat Dr. Wendy Watson-Wright at the time had done was established certain priorities, certain Science priorities. And what the next step is, is to look within those priorities and further refine those priorities so that we have some good tangible deliverables in terms of what Science needs to do when we move forward.⁸⁶

The Research Agenda and the Research Plan are designed to guide allocation of funding. However, I heard that little, if any, new funding has been allocated for the research priorities identified in these documents. A discussion of funding for Science follows below.⁸⁷

Prioritizing science advice to DFO management

DFO has developed a process for determining and prioritizing requests for science advice made to its national Science sector by managers through the national Centre for Science Advice Secretariat (CSAS) and to its Science Branch in the Pacific Region, through the Centre for Science Advice, Pacific (CSAP, previously known as the Pacific Science Advice Review Committee or PSARC).

Alan Cass, the former regional head of CSAP, testified about the development of the annual schedule. As described by Mr. Cass, the regional director, Science, each year sends out a “request for advice” to the other regional directors, which sets out the “objectives, rationale, timing, urgency, [and] importance of the particular issue” requiring scientific research.⁸⁸ The regional directors send their requests to the CSAP office. The requests are received by the Science Branch and prioritized based on the perceived risk.⁸⁹

The Regional Management Executive Committee* reviews and assesses the list of requested research again, prioritizing the requests based on the region’s fiscal planning and delivery capacity, as well as legal obligations, setting out a “business plan for conducting the assessments within Science over one or possibly two years.”⁹⁰

The mandate of DFO’s Science Branch and the role of the Regional Management Executive Committee expanded in the past few years to emphasize the need to have a process to prioritize the growing and diverse list of requests, which had

expanded beyond the traditional role of providing science advice for fisheries management to a range of other issues, in particular to the *Species at Risk Act* where the focus moved from managing fish stocks to ... advising in terms of the legal obligations on the ... health of species that were considered by COSEWIC [Committee on the Status of Endangered Wildlife in Canada] to be endangered ... or threatened.⁹¹

Once completed, the review and “challenge” of its scientific research projects continues at CSAS and at CSAP, using a peer-review process, the product of which was described by Mr. Cass as follows:

[W]e have a number of products in the peer-review process that are outcomes of meetings, and one of them is called a research document which is a finalized version of ... a working paper which is a draft submission to ... [CSAP] ... if that’s approved and based on revisions following the review, then that becomes a research document which ... could be a rather intensive technical document that presents the information as far as the analyses and results and recommendations ... and that is authored by the key people who actually did the analysis and write the report ...

Then there’s also what’s called the Science Advisory Report, which is a DFO product. It’s not authored by an individual, but [is] the key document which summarizes the advice that goes forward from the reviews. There are proceedings documents which are essentially now minutes of the individual review meetings. But those are documents that come from the peer review process.⁹²

The peer-review process engaged in at CSAP meetings includes both DFO scientific staff and external participants. Dr. Richards, Pacific regional director, Science, commented:

* This was also referred to as the resource management executive committee by some DFO witnesses.

At that [CSAP] peer review meeting, we do invite external people to come as full participants. We do have a record of advice from that meeting. That advice is then tabled and presented to the managers who requested that advice. That advice is – we try to arrive at that advice by consensus, but it may be that you can't arrange or arrive at consensus, in which case we try to ensure that we provide alternative points of view with a justification around that so that we can ensure that we hear different sides of the story and that we can make sure that we portray the full picture to the decision [maker].⁹³

I heard evidence, however, that the CSAS and CSAP processes do not include the provision of science advice from DFO to other government departments, such as Environment Canada, on issues in which DFO Science may have expertise.⁹⁴ I also heard evidence (as discussed further in chapters 6, Habitat management, and 9, Fish health management) that individual DFO scientists do not necessarily determine the nature of the research they pursue.

Shift to ecosystem science

As discussed in several places in this Report, DFO is moving toward ecosystem-based management and its policies indicate a commitment to ecosystem science to support an ecosystem approach to management. Dr. Watson-Wright explained that one of DFO's overriding priorities is to move to ecosystem science, away from DFO's traditional focus of research on an issue-by-issue or species-by-species basis.⁹⁵ The Research Plan is intended to illustrate DFO Science's "commitment to ecosystem-based research."⁹⁶

DFO Science produced its Ecosystem Science Framework⁹⁷ in 2007. It contains the rationale for an "ecosystem science approach and describes the proposed framework for realigning the DFO Science program to support an ecosystem approach to management and better reflect an ecosystem science program."⁹⁸ In the Ecosystem Science Framework, the key components that reflect the highest-priority management and policy challenges of both DFO and the Government of Canada and the "multi-functional nature of an ecosystem science approach" are listed as

- 1 risk assessment tools;
- 2 performance evaluation of ecosystem indicators;
- 3 tools for evaluating decision-support rules;
- 4 operationalize regime shifts;
- 5 apply knowledge of productivity changes;
- 6 recovery potential of depleted species;
- 7 key features of ecosystem structure and function;
- 8 knowledge access and spatial management methodologies; and
- 9 best practices for ecosystem assessments.⁹⁹

Dr. Mithani testified that the Ecosystem Science Framework is still the guiding document for DFO Science.¹⁰⁰ The term, "ecosystem science" refers to science that attempts to look at a geographical location on an ecosystem basis. It looks at all the processes and species in that particular ecosystem that could affect the target species (for example, Fraser River sockeye) and each other.¹⁰¹

Dr. Watson-Wright stated that the merit of ecosystem science is that it recognizes that you cannot just look at one species of interest in order to understand what is going on, as everything is interconnected.¹⁰² The Ecosystem Science Framework states that DFO's ability to implement an ecosystem science approach is limited because data do not exist for many aquatic habitat features and populations of importance and, where information does exist, it may not be organized in ways that allow DFO Science to access it efficiently and systematically.¹⁰³ Dr. Watson-Wright was then asked how realistic an ecosystem-based approach is, given the state of the science and resources. In her view, it is realistic and necessary to try to put all the information together for a given ecosystem in order to be able to make predictions and projections. She said that ignoring most of the data and focusing on one species is not helpful. Further, according to Dr. Watson-Wright, the international science community is struggling with this issue right now, and it behooves DFO to continue to improve upon this work.¹⁰⁴

Ms. Dansereau testified that DFO is still in the early stages of implementing its ecosystem science approach and will be in the early stages for a "long time," although this fact does not mean that DFO is not making progress.¹⁰⁵

DFO views the Strait of Georgia Ecosystem Research Initiative as a good example of an

ecosystem science approach.¹⁰⁶ The initiative is trying to understand how the Strait of Georgia ecosystem works, identify the drivers of change most likely to determine future conditions, and analyze the future response to the system under these influences.¹⁰⁷ Gordon McFarlane, DFO scientist emeritus, agreed that this research initiative is an example of an “ecosystem assessment” approach.¹⁰⁸

According to DFO, ecosystem research initiatives are to serve as a pilot for its ecosystem-based approach by focusing on regional research priorities.¹⁰⁹ Peter Olesiuk, marine mammal biologist, DFO Pacific Biological Station in Nanaimo, said that the Strait of Georgia Ecosystem Research Initiative stands out as the example of a project that was not reactive to any issue, but was more visionary.¹¹⁰

There are three major research priorities: (1) determining what controls productivity in the Strait of Georgia; (2) assessing the importance of mismatches in the timing of physical and biological processes within the Strait of Georgia to ecosystem functioning; and (3) determining what properties of the ecosystem “provide resilience against major disruptions and collapses of the system.”¹¹¹

However, Dr. Andrew Trites (one of the authors of Technical Report 8, Predation) is critical of the initiative. Although the Strait of Georgia Ecosystem Research Initiative was, in his opinion, a wonderful initiative, he is concerned that academics are not involved in this work. In Dr. Trites’s view, DFO as the management agency should be playing a greater leadership role in generating a coordinated approach to science and, in doing so, should be more inclusive of academics, environmental organizations, First Nations, and people concerned about sustainability.¹¹²

Funding of DFO Science and resulting “research gaps”

Dr. Richards, Pacific regional director, Science, testified that the Science Branch’s average year-end expenditures for the previous five years from all sources were approximately \$55 million per year.¹¹³

The Research Agenda identified priorities for DFO Science for 2007–12.¹¹⁴ The Research Agenda and Research Plan were designed to guide allocation of funding rather than to specify funding.¹¹⁵ Accordingly, the fact that a research priority is identified in the Research Agenda or in the

Research Plan does not ensure that DFO allocated funding for it.¹¹⁶

The current research funding model for DFO Science is in limited-term, three- to five-year funding envelopes. Robin Brown, division head, Ocean Sciences Division, DFO Institute of Ocean Sciences, does not think that limited-term funding is a successful model for science research.¹¹⁷ Other DFO witnesses agreed that short-term funding envelopes create inadequacies in scientific research. During the hearings on predation, Gordon McFarlane testified that two- to three-year funding envelopes are not ideal to implement ecosystem-based management for sockeye salmon.¹¹⁸ I heard from several other DFO and Environment Canada witnesses that an integrated research program focused on Fraser River sockeye and long-term research and monitoring work would help ensure the long-term sustainability of the fishery, but that, given the limited-term nature of federal science funding, this kind of work is not currently possible.¹¹⁹

On climate change, DFO has never been considered a lead agency in Canada, and this fact limits the funding available to DFO Science to do this work in the marine environment.¹²⁰ Mr. Brown explained that DFO understands what its priorities are relative to other federal departments in part by whether it is allocated funding for an issue; therefore, if research is not funded, then DFO tends to take this as a signal that it is not important for the department to do this work.¹²¹

For example, there is no DFO program funding for research or monitoring of contaminant fate and transport within the environment, even in relation to anadromous fish (see Chapter 6, Habitat management), and DFO as a department (as opposed to individual researchers within the department) takes the position that it is not responsible for this work. However, it is the view of Environment Canada that population-level effects of contaminants, in particular the effect on anadromous fish and the marine environment, are within DFO’s purview. DFO and Environment Canada witnesses testified that there are gaps in contaminant research and monitoring for Fraser River sockeye as a result of the differences between what each department thought was its responsibility.

As discussed further in Chapter 9, Fish health management, Dr. Richards testified that she is aware of the gap in research regarding the health of

wild fish, and that DFO is looking for opportunities to address it.¹²² However, DFO's scientific research priorities are dictated by its clients (see discussion above about setting priorities).¹²³

■ Aboriginal traditional knowledge and DFO Science and management

Aboriginal traditional knowledge (ATK), sometimes referred to as traditional ecological knowledge (TEK), was described to me as a “cumulative body of knowledge, practice and belief, handed down through generations by cultural transmission.”¹²⁴

Aboriginal witnesses and scientists described to me the significant value that they see in Aboriginal traditional knowledge and in its incorporation into DFO's management of the fishery. For example, members of the Chehalis, Heiltsuk, Tl'azt'en, Siska, and Métis nations, among others, have asserted the importance of incorporating Aboriginal traditional knowledge into fisheries management decision-making.¹²⁵ Thomas Alexis of the Tl'azt'en Nation believes that, “if traditional knowledge had been listened to, then [sockeye] stocks would still be abundant today.”¹²⁶

A number of scientists appearing before me agreed that Aboriginal traditional knowledge can contribute to current understanding of Fraser River sockeye. For example, Dr. Jim Irvine, research scientist, SAFE, DFO Pacific Biological Station, suggested that traditional knowledge, whether from First Nations or others living in a particular area, could assist in identifying Conservation Units (CUs) under the Wild Salmon Policy (see Chapter 10, Wild Salmon Policy) and observing fish distribution, migration, and spawning.¹²⁷ Dr. Carrie Holt, research scientist, DFO Pacific Biological Station, said that traditional knowledge could contribute to the overall assessment of CUs (red, amber, or green).¹²⁸ Dr. Brian Riddell, chief executive officer, Pacific Salmon Foundation, and former DFO division head, SAFE, and Dr. Scott Hinch, professor, Pacific salmon ecology and conservation laboratory, University of British Columbia, spoke about the importance of local observation, including Aboriginal observations, in assessing migration conditions.¹²⁹

David Marmorek, author of Technical Report 6, Data Synthesis, suggested that Aboriginal traditional knowledge is important because of the long time span it covers.¹³⁰ Dr. David Close, distinguished science professor of Aboriginal fisheries, UBC, said that both western science and traditional knowledge should be used to move conservation forward.¹³¹

A presentation prepared by DFO staff entitled “Considering ATK in the Implementation of the [Wild Salmon Policy]” summarized some of the benefits of traditional knowledge.¹³² It suggests that Aboriginal traditional knowledge considers the ecosystem context; provides broad trends in species and stock distribution, abundance, and seasonal behaviour patterns; offers observations on a longer temporal scale; can save time and money on field work; and can help determine baseline data.¹³³ From a practical perspective, Captain Gary Ducommun, director of natural resources for the Métis Nation British Columbia, suggested that incorporating Aboriginal traditional knowledge into fisheries management also carries the benefit of engaging with Aboriginal people, which may lead to increased understanding and support by them of DFO decision making in regard to salmon.¹³⁴

Difficulties in incorporating traditional knowledge

Witnesses identified several challenges to the incorporation of Aboriginal traditional knowledge into DFO decision making and the work done by DFO Science. The first challenge is in understanding what Aboriginal traditional knowledge is and what it is not. Although several scientists expressed support for Aboriginal traditional knowledge, it was not always clear whether they were referring to traditional knowledge or field observations more generally.¹³⁵ Mike Lapointe, chief biologist, Pacific Salmon Commission, distinguished his “science perspective” from traditional ecological knowledge, which he acknowledged as an important different perspective, but one about which he was not qualified to speak.¹³⁶ Mark Saunders, manager, SAFE, DFO, expressed his uncertainty this way:

I feel very strongly that one of the most important linkages is to bring western science and the traditional – aboriginal traditional knowledge

together. I don't pretend to understand, after having talked to a lot of First Nations people, and I find it very difficult as a western scientist to be able to understand exactly what ATK is.¹³⁷

Although some forms of traditional knowledge may be readily transferred to others, some may not.¹³⁸ I am advised of potential difficulties in transferring regionally specific and tribally specific Aboriginal traditional knowledge from the person with the knowledge to someone else who is the decision maker.¹³⁹ Some sacred traditional knowledge is dearly held and not shared beyond an Aboriginal community.¹⁴⁰ In some cases it may take years or decades of relationship and building trust before traditional knowledge is shared and concerns about intellectual property, privacy, and misuse of data are overcome.¹⁴¹

With the decline of the fishery, some Aboriginal traditional knowledge itself has been lost. Traditional knowledge is held by a limited number of individuals, often elders, and may be passed on through fishing.¹⁴² As fewer fishing opportunities arise, it has become more difficult for elders to pass on this knowledge. For example, Chief Fred Sampson of the Siska Indian Band spoke of the difficulty he had in passing on traditional fishing knowledge to his son.¹⁴³ Similarly, Rod Naknakim of the Laich-kwil-tach Treaty Society suggested that, given the importance of limited fishing opportunities, more experienced fishers are called on for the fishery instead of teaching the "greenhorn" younger generation.¹⁴⁴ Dr. Ronald Ignace of the Skeetchestn Indian Band testified that, as a result of the declining fishery, "we have lost so much of our ... knowledge of the fishery," especially among the young people today.¹⁴⁵

Changing ecosystems and fishing practices have also affected the applicability of traditional knowledge. Chief Sampson explained that certain biological indicators are now less reliable than they were in the past, perhaps because of shifts in biodiversity that have occurred since the knowledge was acquired.¹⁴⁶ Joseph Becker of the Musqueam First Nation also suggested that traditional knowledge may need to evolve because fish and methods of fishing have changed.¹⁴⁷

According to a report prepared by Dovetail Consulting, a further difficulty exists in verifying the accuracy of traditional knowledge.¹⁴⁸ However, it appears that DFO currently advises against challenging the accuracy of Aboriginal traditional knowledge. A DFO presentation on Aboriginal traditional

knowledge in the context of the WSP states that the "PSARC review process creates a challenge function that is advised against when dealing with ATK."¹⁴⁹

Current approaches to incorporating traditional knowledge

According to Ms. Farlinger, DFO is "very interested in [Aboriginal traditional] knowledge because of the contribution we think it can make to the management of Fraser sockeye,"¹⁵⁰ and DFO has "done some work with First Nations on the integration of traditional knowledge" although "there is much work to be done[.]"¹⁵¹ For example, DFO currently has not formalized any specific processes regarding incorporation of traditional knowledge.¹⁵²

According to a DFO presentation, Aboriginal traditional knowledge may be transferred to DFO through its general engagement with Aboriginal groups.¹⁵³ On a more structured level, DFO's National Centre of Expertise in TEK, the Aboriginal traditional knowledge subcommittee of COSEWIC, and the National Aboriginal Council on Species at Risk appear to be other venues for incorporating Aboriginal traditional knowledge.¹⁵⁴ The consideration and incorporation of such knowledge is also one of the key directions in DFO's WSP¹⁵⁵ and, according to Kaarina McGivney, former regional director, Treaty and Aboriginal Policy Directorate, DFO Pacific Region, is found in other policies and practices.¹⁵⁶ As an example, in WSP implementation, Dr. Hyatt testified that regional DFO employees have expressed interest in using traditional ecological knowledge and working with First Nations to identify and test biological indicators.¹⁵⁷ The WSP states that resource management decisions will reflect best science, including ATK, and provides that the delineation of Conservation Units will include ATK.¹⁵⁸

DFO's approach to Aboriginal traditional knowledge has been criticized. Marcel Shepert, coordinator, Upper Fraser Fisheries Conservation Alliance, testified that traditional knowledge has been given "lip service" in the past 15 years.¹⁵⁹ Mr. Saunders told me that he was unaware of any funding for engaging traditional ecological knowledge or for gathering traditional ecological knowledge, and Chief Sampson testified that traditional knowledge is not currently

respected or recognized by contemporary scientists and biologists.¹⁶⁰ He said that Aboriginal traditional knowledge ought to be treated equally with other forms of knowledge.¹⁶¹ Chief William Charlie of the Chehalis Indian Band added that all Aboriginal traditional knowledge should be incorporated into management practices, without “picking and choosing” when to consider using it and when not to.¹⁶²

Proposed approaches to incorporating traditional knowledge

Several witnesses suggested that Aboriginal traditional knowledge might be incorporated into management by greater involvement of Aboriginal groups in scientific and decision-making processes. Dr. Holt suggested that traditional knowledge could be brought closer to the scientific process using “a more concrete consultative process.”¹⁶³ Mr. Saunders suggested that First Nations should take the lead role in explaining their position or their understanding of how best to incorporate traditional knowledge.¹⁶⁴

Other witnesses proposed co-management between DFO and Aboriginal groups as a means to incorporate traditional knowledge into fisheries management. Several Aboriginal witnesses described the importance of bringing Aboriginal traditional knowledge to the decision-making table,¹⁶⁵ and Neil Todd, operations manager, Fraser River Aboriginal Fisheries Secretariat, said that the only way to do so is through a joint-management process.¹⁶⁶ For effectiveness, Mr. Alexis of the Tl’azt’en Nation suggested that each nation or sub-region in the watershed could feed their local and traditional knowledge into larger Aboriginal organizations.¹⁶⁷

The First Nations Coalition submitted that First Nations should develop a set of best practices or guidelines for the use of traditional knowledge and science and that DFO should support this endeavour.¹⁶⁸

Findings

I accept the testimony of Aboriginal witnesses that certain members of their communities hold Aboriginal traditional and ecological knowledge

relevant to the conservation and management of Fraser River sockeye. Several scientists and Department of Fisheries and Oceans (DFO) managers also recognized the significance of this information, which may include a long time-series of local observation of the environments and species within traditional Aboriginal territories. I agree that this information is valuable and should inform the management of the fishery and fish habitats.

I heard that DFO has taken some steps to consider Aboriginal traditional and ecological knowledge but that it has faced challenges in doing so. I accept that it may be difficult to gather, translate, and apply Aboriginal traditional knowledge in the context of changing environmental conditions and other scientific analysis. Improved working relationships between DFO and First Nations may be required to encourage broader sharing and recognition of Aboriginal traditional knowledge. DFO should continue to strengthen these relationships in order to address these difficulties and realize the potential value of Aboriginal traditional knowledge, including in the implementation of strategies 1, 2 and 3.

Several witnesses and participants suggested an increased Aboriginal role in the management of the fishery so that Aboriginal traditional knowledge may be brought to bear. One of the management processes described in this Report is the strategic and integrated planning process under Strategy 4.2 of the WSP (described in greater detail in Chapter 10, Wild Salmon Policy, and Volume 3, Chapter 2, Recommendations). Strategy 4.2 envisions a principal role for First Nations in that planning process, a role which should include the opportunity to apply Aboriginal traditional knowledge.

■ DFO policies

Introduction

I heard a great deal of evidence about DFO’s policies and their role and importance to the department, to resource users, and to the Canadian public. I also heard evidence about DFO’s implementation of and adherence to their policies.

Canada’s fishing policies govern DFO’s management of the fishery,¹⁶⁹ and it is through its policies that DFO articulates its priority of

conservation.* DFO uses written policies to provide direction and guidance regarding its operations to its own employees, to those involved in the fisheries, and to the public. Ms. Dansereau told me that a policy continues to direct DFO's operations in the given subject matter until it is replaced by a new policy. The deputy minister testified that DFO is working to integrate its various policies wherever possible so that they are linked in a coherent fashion.¹⁷⁰

Although the impetus for a given policy may occur at the regional level (see, for example, the development of the WSP), DFO's national policy sector develops and produces the department's policies, which are then approved by the Departmental Management Committee. The deputy minister also referred to a new "deputy minister's policy committee," which is responsible for revising departmental policies and, presumably, for developing them.¹⁷¹

Some DFO policies have national application (such as the 1986 Policy for the Management of Fish Habitat, discussed in Chapter 6, Habitat management); some are specific to the Pacific Region (for example, from 1999, An Allocation Policy for Pacific Salmon, discussed in Chapter 5, Sockeye fishery management). According to senior management, regional policies are "nested" within broader national policies, but they are not developed in isolation from DFO's national headquarters.¹⁷² The responsibility of regional management is "to implement the programs of the Department in line with the policies of the Department," and Ms. Farlinger agreed that, as the most senior DFO official in the region, she would be involved more in the development of policy than in overseeing its operation or implementation.¹⁷³

According to Ms. Dansereau, the minister is the "key policy maker for the Department," and although the deputy minister advises the minister about the department's policies, it is the minister's prerogative to decide whether to become involved in the development or approval of policies.¹⁷⁴ The 1998 statement of then Minister David Anderson, in response to declining coho salmon stocks – which became DFO's *A New Direction for Canada's Pacific Salmon Fisheries* (discussed below) – illustrates a minister's involvement in the development of policy.

DFO often develops its policies in reaction to new legislation (for example, the *Oceans Act* required the creation of Canada's Oceans Action Plan), or a court decision (the Supreme Court of Canada's 1990 *Sparrow* decision prompted the creation of DFO's Aboriginal Fisheries Strategy), or a report critical of its practices (Pacific Fisheries Reform: Building a Sustainable Fishery is identified by DFO as a response to the external reports, *Treaties and Transitions: Towards a Sustainable Fishery on Canada's Pacific Coast and Our Place at the Table: First Nations in the B.C. Fishery*).¹⁷⁵

The terminology used by DFO to describe its policies is confusing: witnesses described "frameworks," "initiatives," "discussion papers," "programs," and "visions," and there may well be others. I found it difficult to assess the weight or import of a given DFO policy in comparison to other policies, and this confusion was acknowledged by at least one DFO employee.¹⁷⁶ I sought clarification of the differences between the various documents and their roles. I was able to determine that, generally speaking, a framework represents "an overarching approach, as opposed to the detail and the application [of a policy]," and contains "more process and rules and responsibilities" than a policy.¹⁷⁷ A framework might also enunciate objectives and key principles.¹⁷⁸ I was also told that although a framework "would be at the top of the pile ... there can be smaller frameworks within an overall program."¹⁷⁹

A program is funded (that is, it has a specific budget), has ascertainable goals, and is considered the operation of the policy.

[A] program generally has the attributes that there will be specific deliverables, there will be a budget attributed to those deliverables and there will be timelines ... A policy, on the other hand, is directional and may or may not have funds associated with implementing it ... [A policy is] intended to change behaviour, and it is not only the behaviour of how we operate our programs and regulations inside the Department, but it's also intended to change the behaviour of people who use the resource or people who do development on habitat, anyone who is affected by that regulation.¹⁸⁰

* For example, Policy for the Management of Aboriginal Fishing, and Wild Salmon Policy.

[A] policy should set out the broad principles, set out the direction, and a program will tell or describe how we do things and how we measure things.¹⁸¹

The distinction between program and policy ... is really the primary one. It's probably useful to know that policy comes in a number of forms, and it has sometimes come in the past as a form of Ministerial announcement. It has come as a documented policy ... And more recently we have seen collectively the attempt to bring those policies together, update them and make them coherent.¹⁸²

[P]olicies are hierarchical in the sense that they need to become more detailed as they are applied more specifically, and programs are things that go on and are influenced and directed by the policies.¹⁸³

An initiative is similar to a program and was described to me as an action that is taken congruent with a policy.¹⁸⁴

A discussion paper may be an initial draft of a policy (or of a program) and is the means through which DFO will consult on the anticipated policy.¹⁸⁵ A policy sets out "on the ground implementation."¹⁸⁶

A discussion paper would be used very often in the development of a policy, or even in the development of a program. So it would be something that we would generate or have generated for us to think about and talk about, or even for a committee to think about in the development of a program or policy.¹⁸⁷

In its final written submissions, Canada offered the following context for DFO's policies:

DFO policies come in a variety of forms, depending on the audience and intent of the policy. Several different terms are used by DFO in the development and presentation of policies. For example, a "discussion paper" is often written to help facilitate consultation on a proposed policy. Once consultation has been completed and a policy is approved, it often is encompassed in documents referred to as a "vision," "reform," "new direction" or "frame-

work" to help explain its purpose. Generally speaking, policies are hierarchical in the sense that they become more detailed [as] they are applied more specifically.

...

Departmental policy development related to the management of fisheries and their ecosystem is guided by a range of considerations that include legislated mandates, judicial guidance, and international and domestic commitments to promote biodiversity and a precautionary, ecosystem-based approach to the management of marine resources. While the policies themselves are not subject to annual changes, annual implementation details are continually reviewed and adjusted to meet current needs in the ever-changing environment in which DFO operates.¹⁸⁸

Overview of selected DFO policies

In this section I describe DFO's broad policies, applicable to multiple topics covered in this Inquiry. In the chapters of this volume that follow, I provide more detailed descriptions of other policies; for example, the 1986 Habitat Policy, which is discussed in Chapter 6, Habitat management, or the Aquaculture Policy Framework, which is discussed in Chapter 8, Salmon farm management.

The Mifflin Plan

In 1996, then Minister Fred Mifflin instituted the Pacific Salmon Revitalization Strategy,¹⁸⁹ commonly referred to as the "Mifflin Plan." The Mifflin Plan was specific to DFO's Pacific Region, focusing on the commercial fishery,¹⁹⁰ and it was based on the "economic [reality]" that "salmon fishing will not provide economic benefits for individuals and communities unless the size of the fleet is reduced."¹⁹¹

Under the Mifflin Plan, DFO – to achieve its objectives of conservation and sustainability – promoted area licensing and reduction of the fleet through licence retirement and buy-back.¹⁹² The Mifflin Plan acknowledged the issue of allocation among the sectors and within the commercial fishing sector, noting that Dr. Art May and Stephen Kelleher were going to address this issue.¹⁹³ May and Kelleher's work would later lead to the

1999 Allocation Policy for Pacific Salmon, developed under DFO's New Directions policy series discussed below and in the section on allocation in Chapter 5, Sockeye fishery management.

The Mifflin Plan "was a significant step in recognizing the challenges both for those people who were harvesting the fish and also for the managers in reducing the fishing power of that community to deal with the conservation issues."¹⁹⁴ It accompanied the Canadian Fisheries Adjustment and Restructuring Plan, which instituted a commercial licence buy-back program.¹⁹⁵

A New Direction for Canada's Pacific Salmon Fisheries

In October 1998, then Minister Anderson announced *A New Direction for Canada's Pacific Salmon Fisheries*¹⁹⁶ (New Directions policy series), arising out of concerns about the declining coho stocks.¹⁹⁷ Stemming from the New Directions policy series, DFO created several discrete policies over the next four years, which together form what DFO refers to as the "New Directions" policy series or the "New Directions" policy framework.¹⁹⁸ These policies are: An Allocation Policy for Pacific Salmon (1999),¹⁹⁹ A Framework for Improved Decision-Making in the Pacific Salmon Fishery Discussion Paper (2000),²⁰⁰ A Policy for Selective Fishing in Canada's Pacific Fisheries (2001),²⁰¹ and the Pacific Region Fishery Monitoring and Reporting Framework (2002).²⁰² All but one of these policies, the Framework for Improved Decision-Making (2000), are discussed in greater detail in Chapter 5, Sockeye fishery management.

As part of the New Directions Policy, DFO committed to creating what became in 2005 the Wild Salmon Policy (see Chapter 10, Wild Salmon Policy).²⁰³ The deputy minister described the WSP as an essential policy for DFO, "a priority policy on the West Coast," and DFO's "guiding document for the management of Fraser sockeye."²⁰⁴ Ms. Farlinger described these related policies as the "core" policies that are directly implemented in the Pacific Region.²⁰⁵ The New Directions Policy was also described as "extremely pivotal in terms of [DFO's] management and assessment of Pacific salmon."²⁰⁶

In the New Directions Policy, DFO identified three key components as the "new direction" for the Pacific salmon fisheries: conservation, sustainable

use, and improved decision making.²⁰⁷ Ms. Farlinger considers that the New Directions Policy identified conservation as the primary goal of fisheries management, and that it states its priority as conservation "in a much clearer way than had been set out in the past."²⁰⁸ The New Directions Policy specifies:

The need for a new conservation ethic for our salmon resources and their habitat is widely accepted. Fish and habitat must be protected from irreversible depletion and the diversity of species conserved for future generations. Therefore, sound scientific advice will continue to guide fisheries and habitat management decisions.²⁰⁹

The New Directions Policy sets out 12 principles grouped under the three key component subject areas, which provide direction to DFO and guide its operation and management of the salmon fishery:²¹⁰

Conservation

Principle 1: Conservation of Pacific salmon stocks is the primary objective and will take precedence in managing the resource.

Principle 2: A precautionary approach to fisheries management will continue to be adopted.

Principle 3: Continue to work toward a net gain in productive capacity for salmon habitat in British Columbia.

Principle 4: An ecological approach will guide fisheries and oceans management in the future.

Sustainable Use

Principle 5: The long term productivity of the resource will not be compromised because of short term factors or considerations – tradeoffs between current harvest benefits and long term stock well-being will be resolved in favour of the long term.

Principle 6: All sectors – First Nations, recreational and commercial – will use selective methods to harvest salmon.

Principle 7: First Nations requirements for food, social and ceremonial purposes will

continue to have first priority after conservation requirements.

Principle 8: Whenever possible, the recreational fishery will be provided with more reliable and stable fishing opportunities.

Principle 9: The commercial fishery will be a more diversified (less dependent on salmon) and economically viable sector, better able to withstand fluctuations in the cycles of the resource and the market.

Improved decision making

Principle 10: Clear, objective and relevant information on major issues requiring decisions will be provided to the public with sufficient time and opportunity for review, comment and feedback. Periodic review of progress and achievements will be initiated to facilitate accountability for the sound management of the salmon resource and its habitat.

Principle 11: Government and stakeholders will together be responsible and accountable for sustainable fisheries.

Principle 12: Enhanced community, regional and sector wide input to decision making will be pursued through a structured management and advisory board system.

Under the “next steps” section of the New Directions Policy, the following is set out:

The federal government recognizes that the salmon fisheries of the future will be very different from those of today and that a number of people will be affected by such change. Therefore, the federal government is making a new investment of \$400 million to increase efforts in protecting and rebuilding salmon habitat; restructure the commercial fishing industry by moving to selective harvesting, diversifying fishing income, and further reducing the fleet; and, assisting people adapt to the changing fishery. ...

This document sets out the broad policy direction associated with a new approach to the

Pacific salmon fisheries. Based on this direction, a detailed set of operational policies for the management of the salmon resource will be developed. Consultations with the public, communities and stakeholders will now begin. The Government of British Columbia will be included in this process. These policies will cover the full range of activities involved in the management of the resource, including salmon allocation, selective fishing, and a wild fish policy.²¹¹

In June 1998, in conjunction with the New Directions Policy, the federal government announced the \$400 million Pacific Fisheries Adjustment and Restructuring (PFAR) program, which was to be invested over a five-year period. The purpose of PFAR was to assist those involved in the fishing industry to adjust to the changes occurring in the Pacific fishery.

The shift to ecosystem-based management

When asked about the shift in DFO's priorities over the last 25 years, the deputy minister highlighted the department's move to ecosystem-based management.²¹² During 2010 and 2011, DFO renamed some of its national sectors and regional branches to reflect its commitment to ecosystem-based management.

According to DFO senior management, an ecosystem-based approach involves managing individual programs (fisheries, aquaculture, and habitat) while taking the broader ecosystem into consideration.²¹³ In contrasting an ecosystem-based approach to the previous way of managing fisheries and oceans, Mr. Bevan testified:

We don't know the details of how each ecosystem works and people say it's not rocket science and it isn't. It's way more complex ... You've got to be cautious and you've got to understand that you don't know. And I think that's one of the huge issues in the past; we assumed we knew. We assumed we knew how much fish was there. We assumed we knew that if you've harvested at a particular fishing mortality, the fish could be maintained at maximum sustainable yield. And that presupposes a stable state in the ecosystem, so we assumed the ecosystem was stable, constant, and the only variable that we needed to con-

trol was the fish harvesting and we assumed, as I said, that we knew with some degree of certainty the population. And we didn't know the population with that level of certainty and we certainly didn't understand how that population was reacting in the ecosystem and we've paid the price for that hubris.²¹⁴

In 2007, as part of its science renewal process (discussed above), DFO Science produced the document *A New Ecosystem Science Framework in Support of Integrated Management* (Ecosystem Science Framework).²¹⁵ The Ecosystem Science Framework confirmed that the highest priority for DFO Science is providing scientific support for ecosystem-based management.²¹⁶

DFO has stated its commitment to ecosystem-based management in several of its policies. Principle 4 of its 1998 *New Direction for Canada's Pacific Salmon Fisheries* states that "an ecological approach will guide fisheries and oceans management in the future" and provides:

The definition and practical implementation of an ecological approach to fisheries and oceans management is complex. Work has been initiated to clarify its application. However, it is clear that an ecosystem approach involves understanding and providing for the complex interactions between the different species and requires a move away from the current single species management.²¹⁷

The 1997 *Oceans Act* expressly requires the minister to develop a national strategy for managing "estuarine, coastal and marine ecosystems" in Canada's oceans.²¹⁸ It led to the 2002 Canada's Oceans Strategy,²¹⁹ which introduced a nationally coordinated "integrated management" system for marine ecosystems and called for a "commitment to planning and managing human activities in a comprehensive manner while considering all factors necessary for the conservation and sustainable use of marine resources and the shared use of ocean spaces."²²⁰ Dr. Villy Christensen and Dr. Andrew Trites, authors of the Commission's Technical Report 8, Predation, equate this commitment in the Oceans Strategy to ecosystem-based management.²²¹

Some witnesses expressed reservations about ecosystem-based management. Trevor

Swerdfager, former director general, Aquaculture Management Directorate, DFO, stated that, although he endorses the general concept of ecosystem-based management, he has reservations about its practical implementation. In Mr. Swerdfager's view, the idea has "tremendous theoretical allure ... [and] understanding [an ecosystem] on a broad-based multi-disciplinary scientific perspective makes an awful lot of sense."²²² However, translating the theory into specific management decisions and actions is, in his opinion, much more difficult. He cited as an example the difficulty in translating fish farm licensing decisions, which are yes-or-no decisions, into broad-based ecosystem approaches.²²³

In contrast, Dr. Kim Hyatt, ecosystem research scientist, SAFE, DFO Pacific Region, is of the opinion that ecosystem-based management is not something that is implemented or not implemented. According to Dr. Hyatt, many aspects of ecosystem-based management are already incorporated in the management of wild salmon, some of which were initiated well before the WSP. However, Dr. Hyatt acknowledged that ecosystem-based management is not an all-or-nothing proposition: it is incremental and becomes increasingly complex and informative as it evolves.²²⁴

In its final submissions, the First Nations Coalition expressed concern about DFO's move toward ecosystem-based management, submitting that DFO has no consistent agreed-upon definition or framework to guide its ecosystem approach to management.²²⁵ In a presentation to the strategic directions committee, DFO acknowledged that there is currently a lack of common understanding of the ecosystems-based management terminology, and no consistent agreed-upon definition or framework to guide its implementation.²²⁶

In Technical Report 8, Predation, Dr. Christensen and Dr. Trites note a trend toward ecosystem-based management of fisheries over the last decades.²²⁷ According to the authors, ecosystem-based management entails developing an understanding of "how the environment, humans, and other ecosystem components impact ecosystems – which is exactly where the [traditional stock] assessment of Fraser River sockeye falls short."²²⁸ In their view, it is particularly relevant to salmon managers and their need to incorporate information on predator-prey relationships.²²⁹ Dr. Christensen explained that fisheries have

traditionally been managed on a single-species basis and tend not to fully include considerations of the ecosystem and the environment, whereas there is a strong scientific “almost consensus” that including these considerations will minimize the risk of failure of a species like sockeye.²³⁰

Technical Report 8, Predation, concludes that Canada has not moved far toward ecosystem-based management.²³¹ Dr. Christensen testified that, in principle, DFO has embraced it; however, in his view, the actual implementation is wanting or lagging far behind.²³² He also said that we do not yet know enough to enable managers to start incorporating ecosystem knowledge and values into decision-making processes.²³³

Dr. John Ford, program head, cetacean research, Conservation Biology Section, DFO Pacific Biological Station, identified the Strait of Georgia Ecosystem Research Initiative as an example of the move within DFO to ecosystem-based management (see below and Chapter 6, Habitat management).²³⁴ However, Dr. Christensen and Dr. Trites expressed the view that the funding for ecosystem research initiatives “is insufficient to ever meet the goals of integrated management.”²³⁵ Dr. Christensen also stated that the initiative has good intentions, but the way the funding has been broken up into “piece-meal practice” indicates no clear strategy.²³⁶

On April 26, 2012, after this Inquiry’s evidentiary hearings had concluded, the government introduced Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures* (it received royal assent on June 29, 2012). Part 3, Division 5, of Bill C-38 proposed amendments to the *Fisheries Act* (in particular, sections 2, 6, 32, 35, and 43), the purpose of which is stated in the summary of Bill C-38 “to focus that Act on the protection of fish that support commercial, recreational or Aboriginal fisheries and to more effectively manage those activities that pose the greatest threat to these fisheries.” I discuss the implications of Bill C-38 on DFO’s ecosystem-based management in Volume 3, Chapter 3, Legislative amendments.

Pacific Fisheries Reform

In 2004, the Supreme Court of Canada released its decision, *Haida Nation v. British Columbia (Minister of Forests)*, in which the Court confirmed

the government’s duty to consult with First Nations.²³⁷ That same year, the external reports of the Joint Task Group on Post-Treaty Fisheries, *Treaties and Transition: Towards a Sustainable Fishery on Canada’s Pacific Coast*, and the First Nations Panel, *Our Place at the Table: First Nations in the B.C. Fishery*, examined the state of the Pacific fisheries and recommended reform.²³⁸

In April 2005, the minister announced Pacific Fisheries Reform,²³⁹ which is referred to as a “blueprint for change in the management of Pacific fisheries” or a “management reform initiative,”²⁴⁰ and which was the government’s response to *Treaties and Transition* and *Our Place at the Table*. Ms. Farlinger described the impetus for Pacific Fisheries Reform:

There were reports that had come out at that time from various sources from First Nations about their view of moving forward in Pacific fisheries and their share and their participation in fisheries. There were reviews, again, of allocation in the salmon fishery and how it might move forward post-treaty in B.C. There was a need to implement the conservation aspects, including elements of the Wild Salmon Policy [which had just been announced].²⁴¹

In the announcement, the minister described four “themes” for reform in Pacific fisheries, “to guide Pacific fisheries for years to come”:

First – we need to define conservation objectives through the Wild Salmon Policy. The Wild Salmon Policy, which is now being finalized, will put forward a comprehensive, flexible and co-operative approach to conserving Pacific salmon in the years to come.

Second – we need to strengthen our programs to protect habitat, assess stocks, monitor catches, and enforce the rules of the fishery. We need to find new and innovative ways to deliver these programs with all of our partners.

Third – we need to increase First Nations access to economic fisheries. We want to do this by increasing commercial access for First Nations through voluntary licence-retirement programs ...

And fourth – we need to improve the fishery’s economic performance, and give all users the cer-

tainty and stability they need. We need to work together with First Nations and other resource users to develop a flexible management regime that makes co-management a top priority, with more shared decision making than ever before.²⁴²

In September 2005, DFO released *A Discussion Paper on the Implementation of Pacific Fisheries Reform*, which “elaborated on the Minister’s vision of a reformed management system by identifying and discussing the various aspects of fisheries management that require change.”²⁴³ Like the New Directions Policy, Pacific Fisheries Reform set out a series of principles with which the introduction of changes to the management of Pacific fisheries would be consistent, articulated as follows:

- Conservation is paramount (e.g. consistency with Wild Salmon Policy)
- Consistent legal framework
 - Pacific fisheries resources are a common property resource managed by the Minister of Fisheries and Oceans
 - Fisheries must be conducted under an integrated management plan authorized by the Minister, and
 - Commercial participants fish under the same priority of access and similar rules
- Aboriginal and treaty rights of First Nations
 - First Nations access to food, social and ceremonial fisheries will be respected, and
 - First Nations interests in increased economic access will be addressed in a manner consistent with Canada’s treaty process
- Fair transfer of fishing opportunity
 - Transfer of economic fishing opportunity to First Nations will be accomplished through voluntary licence retirement from willing sellers, and within existing programs, to mitigate impacts on established fishers
- Stable resource access and allocation
 - Certainty will be provided for allocations between harvest sectors (First Nations, recreational and commercial)
 - Allocation policy as it pertains to Chinook and Coho salmon will be maintained
- Certainty of harvest shares will be provided to commercial participants, and
- Commercial harvesters will enjoy a similar level of certainty regarding fisheries access
- Responsibility and accountability
 - First Nations and stakeholders will assume a greater role in operational decision-making and program delivery through effective co-management processes
- Management regimes for commercial fisheries
 - Fleet will be enabled to self-adjust
 - Resource management practices will be designed to optimize economic performance while meeting conservation objectives
 - Fleets will have the capacity to assume a larger share of the cost of management of their fishery
 - Catch monitoring and independent validation will be implemented, and
 - Measures will be adopted to provide confidence that adequate compliance is achieved
- Transition and adjustment
 - Existing government programs will be coordinated to best meet the needs of those impacted by change²⁴⁴

In conjunction with Pacific Fisheries Reform, DFO implemented the Pacific Integrated Commercial Fisheries Initiative (PICFI)²⁴⁵ in July 2007, a five-year funded program designed principally to transfer commercial licences from non-natives to First Nations “and in doing so offset and actually improve conservation by reducing fisheries in areas where the stocks are ... mixed ... transferring those opportunities to First Nations.”²⁴⁶ The federal government committed \$175 million to PICFI.²⁴⁷ (See Chapter 5, Sockeye fishery management, where PICFI is discussed in greater detail in the section on Aboriginal fishing policies and programs.)

Oceans Strategy and Oceans Action Plan

Dr. Watson-Wright, former ADM, Science, acknowledged the challenges faced by the department’s Science sector and regional Science branches in the

1990s and 2000s with the enactment of legislation affecting the department's activities, in particular the *Canadian Environmental Assessment Act* of 1992; the *Oceans Act* of 1996; the *Canadian Environmental Protection Act*, enacted in 1999; and the *Species at Risk Act* (SARA), enacted in 2002.²⁴⁸

The *Oceans Act* expressly requires the minister to develop a national strategy for the management of “estuarine, coastal and marine ecosystems” in Canada’s oceans.²⁴⁹ In 2002, DFO produced Canada’s Oceans Strategy,²⁵⁰ a national policy flowing out of the *Oceans Act*, providing guidance on the oceans’ ecosystems²⁵¹ and reflecting the point at which DFO began to document the concept of requiring an ecosystem approach to management in the salmon fishery.²⁵²

Canada’s Oceans Strategy lists multiple activities, grouped under its main policy objectives, which DFO was to implement over a four-year period and, although I heard some evidence regarding the department’s progress in one of the areas – “improved scientific knowledge base for estuarine, coastal and marine ecosystems” – DFO has not implemented the activities.²⁵³

In the October 2004 speech from the throne, the federal government stated that it would

move forward on [the] *Oceans Action Plan* by maximizing the use and development of oceans technology, establishing a network of marine protected areas, implementing integrated management plans, and enhancing the enforcement of rules governing oceans and fisheries, including rules governing straddling stocks.²⁵⁴

In 2005, DFO released *Canada’s Oceans Action Plan: For Present and Future Generations* (Oceans Action Plan), which “serves as the overarching umbrella for coordinating and implementing oceans activities, and as the framework to sustainably develop and manage our oceans.”²⁵⁵ The intent of the Oceans Action Plan is to develop ecosystem-based management objectives so that human activities can take place in a way that is conserving and sustaining the use of the fisheries resources.²⁵⁶ Canada’s Oceans Action Plan (2005) sets out the following commitment to ecosystems-based, integrated management, marking the point at which DFO began “to document the concept of requiring an ecosystem approach to management”.²⁵⁷

Integrated management is a comprehensive way of planning and managing human activities so that they do not conflict with one another and so that all factors are considered for the conservation and sustainable use of marine resources and shared use of ocean spaces. It is an open, collaborative and transparent process that is premised on an ecosystem-approach. It involves planning and management of natural systems rather than solely political or administrative arrangements, and is founded on sound science that can provide the basis for the establishment of ecosystem management objectives.²⁵⁸

The Oceans Strategy and Oceans Action Plan are discussed in Chapter 6, Habitat management.

Sustainable Fisheries Framework

In 2009–10, DFO developed a national Sustainable Fisheries Framework, which is not a discrete policy but a group of national policies, including:²⁵⁹ Policy for Managing the Impacts of Fishing on Sensitive Benthic Areas,²⁶⁰ Policy for New Fisheries for Forage Species,²⁶¹ The Sustainable Fisheries Checklist²⁶² (part of the revised Integrated Fisheries Management Plan – discussed in greater detail in Chapter 5, Sockeye fishery management), a proposed bycatch policy, and A Fishery Decision-Making Framework Incorporating the Precautionary Approach.²⁶³ DFO situates the Sustainable Fisheries Framework within the context of “fisheries renewal”:

Fisheries renewal is the Department’s national initiative to achieve sustainable fisheries, economic prosperity and improved governance that ensures greater stability, transparency and accountability in fisheries management. Central to this initiative is the Sustainable Fisheries Framework (SFF) established in 2009 to consolidate existing and new fisheries sustainable development policies and tools. The SFF embodies a precautionary, ecosystem-based approach to management and seeks to stabilize fishery allocations through new sharing arrangements between harvesting sectors. This move to defined shares, in turn, requires enhanced catch accountability for each sector

to ensure that all removals of target species and by-catch are properly considered.²⁶⁴

DFO maintains that its recent Sustainable Fisheries Framework (2009–10) provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada. DFO identifies one of the two main elements under the Sustainable Fisheries Framework as “conservation and sustainable use policies,” the purpose of which is to incorporate precautionary and ecosystem approaches into fisheries management decisions to ensure continued health and productivity of Canada’s fisheries and fish stocks, while protecting biodiversity and fisheries habitat. The policies, according to DFO, demonstrate Canada’s commitment to the principles of ecosystem-based fisheries management.²⁶⁵

Precautionary principle / approach policies

In 2003, the Privy Council of Canada produced *A Framework for the Application of Precaution in Science-Based Decision Making about Risk*²⁶⁶ (Federal Framework), which Dr. Watson-Wright described as a “kind of a bible document in the Government of Canada.”²⁶⁷ In Dr. Watson-Wright’s opinion, the Federal Framework set the stage for DFO’s subsequent policy work incorporating the precautionary approach.²⁶⁸ The Federal Framework is expressly referred to in the WSP²⁶⁹ and in DFO’s Fishery Decision-Making Framework Incorporating the Precautionary Approach.²⁷⁰ In the Federal Framework, the question, “What is the application of precaution?” is answered in the following way:

The application of “precaution,” “the precautionary principle” or “the precautionary approach” recognizes that the absence of full scientific certainty shall not be used as a reason for postponing decision where there is a risk of serious or irreversible harm.

The application of precaution is distinctive within science-based risk management and is characterized by three basic tenets: the need for a decision, a risk of serious or irreversible harm and a lack of full scientific certainty.²⁷¹

I note that several variations of the precautionary principle or approach have been expressed in international law, as discussed in Chapter 3, Legal framework. The Federal Framework contains five general principles of application (also reproduced in the WSP) (explanatory language omitted):

- 4.1 The application of precaution is a legitimate and distinctive decision-making approach within risk management.
- 4.2 It is legitimate that decisions be guided by society’s chosen level of protection against risk.
- 4.3 Sound scientific information and its evaluation must be the basis for applying precaution; the scientific information base and responsibility for producing it may shift as knowledge evolves.
- 4.4 Mechanisms should exist for re-evaluating the basis for decisions and for providing a transparent process for further consideration.
- 4.5 A high degree of transparency, clear accountability and meaningful public involvement are appropriate.²⁷²

The Federal Framework also contains five principles for precautionary measures (explanatory language omitted):

- 4.6 Precautionary measures should be subject to reconsideration, on the basis of the evolution of science, technology and society’s chosen level of protection.
- 4.7 Precautionary measures should be proportional to the potential severity of the risk being addressed and to society’s chosen level of protection.
- 4.8 Precautionary measures should be non-discriminatory and consistent with measures taken in similar circumstances.
- 4.9 Precautionary measures should be cost-effective, with the goal of generating (i) an overall net benefit for society at least cost, and (ii) efficiency in the choice of measures.
- 4.10 Where more than one option reasonably meets the above characteristics, then the least trade-restrictive measures should be applied.²⁷³

In May 2006, DFO Science released a paper, *A Harvest Strategy Compliant with the Precautionary Approach*.²⁷⁴ The “context” section of this paper provides the following background for the document’s creation and purpose, referencing the Federal Framework:

Canada has been a strong proponent of the management principles outlined in the United Nations Fish Stock Agreement (UNFSA – also commonly referred to as UNFA) that it ratified in the fall of 1999. The Agreement came into effect in December 2001, and amongst other things, it requires countries to use the Precautionary Approach (PA) in the management of fisheries. At about the same time, the Privy Council Office (PCO) of the Government of Canada developed the Federal Framework for the precautionary approach to ensure that precaution would be applied consistently across disciplines in the government. The framework became government policy in 2003. Over the last few years, there have been some initiatives in Canada to define the precautionary approach in a fisheries context, to identify benchmarks that would be consistent with the approach and to apply it in fisheries management. As risk based decision-making frameworks for Canadian fisheries are being developed, numerous meetings of the Science Sector National Working Group on the Precautionary Approach have been held. At its October 2005 meeting, the Working Group described the minimal requirements for harvesting strategies in these fisheries management frameworks to be compliant with the Precautionary Approach.²⁷⁵

In its introduction section, it says:

The Precautionary Approach is a general philosophy to managing threats of serious or irreversible harm where there is scientific uncertainty ... Good risk management compels us to use caution and to take uncertainty into account when making decisions. The application of precaution requires increased risk avoidance where there is risk of serious harm and uncertainty is great. These conditions often apply in fisheries; therefore precaution should be incorporated in fisheries management.

The Precautionary Approach is applicable to all fisheries management strategies. This report only considers application of the Precautionary Approach to the harvest strategy, one of many management strategies aimed at meeting conservation objectives. It outlines the minimal elements that a harvest strategy for fisheries on exploited species must have to comply with the Precautionary Approach.²⁷⁶

The document then sets out a removal reference for three stock status zones delineated by a limit reference point and an upper stock reference point. According to the later DFO policy, the 2009 Fishery Decision-Making Framework Incorporating the Precautionary Approach,²⁷⁷ this paper outlined the minimum requirements, from a science perspective, for a harvest strategy to be compliant with the precautionary approach.²⁷⁸

Ms. Farlinger described the document, *A Fishery Decision-Making Framework Incorporating the Precautionary Approach*, as one of DFO’s “principal conservation policies.” It sets up, she said, a similar framework to the WSP

that says there is a point below which there will be no fishing ... there is an area between that point and a point of healthy fisheries in which fisheries will be restricted in order to support rebuilding of the stocks. And then over that healthy stock size, there is a point where fishing will be able to go on in a less constrained manner, not completely unconstrained, but less constrained.²⁷⁹

This framework also sets conservation as DFO’s first priority and “says we’re going to manage on an ecosystem basis[.]”²⁸⁰ As stated in this Fishery Decision-Making Framework:

In resource management, the [precautionary approach] is, in general, about being cautious when scientific information is uncertain, unreliable or inadequate and not using the absence of adequate scientific information as a reason to postpone or fail to take action to avoid serious harm to the resource.²⁸¹

As noted earlier, DFO’s senior management consider the Wild Salmon Policy the embodiment of the precautionary approach to management

of wild salmon, and this is noted in the Fishery Decision-Making Framework.²⁸²

Wild Salmon Policy

DFO's senior management considers *Canada's Policy for Conservation of Wild Pacific Salmon* (2005) (Wild Salmon Policy or WSP) to be DFO's guiding document for the management of Fraser River sockeye. The WSP sets out objectives, establishes strategies to meet them, and presents a decision-making approach that seeks to ensure

that choices made about salmon harvest and conservation reflect societal values. The WSP commits DFO to incorporating ecosystem-based management in the development of long-term management plans.²⁸³ One objective of the policy is the maintenance of habitat and ecosystem integrity, and it stresses the importance of ecosystem values and monitoring.²⁸⁴ Because the WSP is so important to the management of Fraser River sockeye salmon, I have devoted the entirety of Chapter 10, Wild Salmon Policy, to the WSP and its implementation.

Notes

- 1 This description of the components of the policy is available on the Treasury Board website, www.tbs-sct.gc.ca. See also Exhibit 1921, p. 2; Claire Dansereau, Transcript, September 23, 2011, p. 43.
- 2 Exhibit 21.
- 3 Exhibit 22.
- 4 Transcript, November 1, 2010, p. 42.
- 5 Exhibit 17; Exhibit 18; Exhibit 19. See also Claire Dansereau, Transcript, September 23, 2011, p. 44; Exhibit 1922.
- 6 Transcript, November 1, 2010, p. 28.
- 7 Exhibit 19, p. 2.
- 8 Claire Dansereau, Transcript, September 23, 2011, p. 44.
- 9 Exhibit 19, p. 2. See also Claire Dansereau, Transcript, November 1, 2010, pp. 40–41.
- 10 Claire Dansereau, Transcript, November 1, 2010, pp. 28–29.
- 11 Exhibit 1922, p. 3.
- 12 Exhibit 17.
- 13 Public submission 0086-Skipper, available at www.cohencommission.ca.
- 14 See, e.g., public submissions 0088-Burns, 0915-Brown, 0229-Cox, and 0234-Phillips, available at www.cohencommission.ca.
- 15 Public submission 0235-COONS, available at www.cohencommission.ca.
- 16 Information acquired from DFO website, www.dfo-mpo.gc.ca.
- 17 Transcript, November 1, 2010, p. 13.
- 18 Information acquired from DFO website, www.dfo-mpo.gc.ca.
- 19 Paul Macgillivray, Transcript, November 1, 2010, pp. 15–16.
- 20 Transcript, pp. 15–16. See also Susan Farlinger, Transcript, September 23, 2011, p. 45.
- 21 David Bevan, Transcript, November 1, 2010, pp. 8–10; Exhibit 15, p. 10.
- 22 Exhibit 17.
- 23 See, e.g., Exhibit 25.
- 24 Paul Sprout, Transcript, December 9, 2010, p. 22.
- 25 Transcript, November 1, 2010, p. 17. See also Transcript, December 9, 2010, p. 22.
- 26 Transcript, November 1, 2010, p. 78; Transcript, December 9, 2010, p. 22.
- 27 Claire Dansereau, Transcript, November 1, 2010, pp. 72–73.
- 28 Transcript, November 1, 2010, p. 74.
- 29 Claire Dansereau, Transcript, November 1, 2010, p. 24.
- 30 Transcript, November 1, 2010, p. 25.
- 31 Brian Riddell, Transcript, February 2, 2011, pp. 39–40.
- 32 Claire Dansereau, Transcript, September 23, 2011, p. 46.
- 33 Susan Farlinger, Transcript, September 23, 2011, p. 46.
- 34 Susan Farlinger, Transcript, September 23, 2011, p. 47.
- 35 See, e.g., Les Jantz, Transcript, May 11, 2011, pp. 20–21, regarding monitoring funding through PICFI; Paul Ryall, Transcript, January 31, 2011, pp. 39–40, 83, regarding test fishing.
- 36 Jim Cave and Brian Assu, Transcript, January 31, 2011, pp. 53–54.
- 37 Claire Dansereau, Transcript, September 22, 2011, pp. 17–18.
- 38 This description of strategic review is available on the Treasury Board website, www.tbs-sct.gc.ca.
- 39 Claire Dansereau, Transcript, September 22, 2011, p. 2. See also September 27, 2011, p. 10.
- 40 Claire Dansereau, Transcript, September 27, 2011, pp. 10–11.
- 41 Claire Dansereau, Transcript, September 22, 2011, p. 3, September 26, 2011 pp. 17, 29; September 27, 2011, p. 11.
- 42 Canada's 2012 Economic Action Plan, "Jobs, Growth and Long-Term Prosperity," tabled in the House of Commons on March 29, 2012, Table 5.1, p. 213.
- 43 Exhibit 25, p. 6.
- 44 See, for example, public submissions 0245-HUSBAND and 0175-BLAGI, available at www.cohencommission.ca.
- 45 See public submissions 0837-WARES, 0839-WARES, 0086-SKIPPER, 0727-SKIPPER, 0915-BROWN, available at www.cohencommission.ca. See also Aquaculture Coalition's written submissions, p. 11, available at www.cohencommission.ca.
- 46 Public submission 0444-PFRCC, available at www.cohencommission.ca.
- 47 Exhibit 903.
- 48 Exhibit 903, p. 1208.
- 49 Public submission 0599-HARTMAN. See also 1157-WARES, available at www.cohencommission.ca.
- 50 Public submission 0245-HUSBAND, available at www.cohencommission.ca.
- 51 Claire Dansereau, Transcript, November 1, 2010, p. 76.
- 52 Wendy Watson-Wright, Transcript, November 4, 2010, p. 3.
- 53 Wendy Watson-Wright, Transcript, November 4, 2010, pp. 13–14.
- 54 Laura Richards, Transcript, November 4, 2010, p. 33.
- 55 Claire Dansereau, Transcript, November 2, 2010, p. 19.
- 56 Laura Richards, Transcript, March 17, 2011, p. 44.
- 57 Peter Olesiuk, Transcript, May 4, 2011, p. 77.
- 58 Robie Macdonald, Transcript, June 6, 2011, pp. 43–44.
- 59 Laura Richards, Transcript, March 17, 2011, p. 78.
- 60 Siddika Mithani and David Bevan, Transcript, November 3, 2010, p. 112.
- 61 Transcript, November 4, 2010, pp. 81–82.
- 62 Laura Richards, Transcript, November 3, 2010, pp. 110–11.
- 63 Transcript, November 3, 2010, pp. 110–11.
- 64 Laura Richards, Transcript, November 3, 2010, p. 111.
- 65 Transcript, November 3, 2010, pp. 2–3.
- 66 Transcript, November 3, 2010, p. 3.
- 67 Transcript, November 3, 2010, p. 3.
- 68 Exhibit 36, p. 5.
- 69 Transcript, November 3, 2010, pp. 4–5.

- 70 Wendy Watson-Wright, Transcript, November 3, 2010, pp. 2–3; Exhibit 36, pp. 6–10.
- 71 Exhibit 37, p. 1.
- 72 Transcript, November 3, 2010, p. 13.
- 73 Exhibit 15, p. 10.
- 74 Transcript, November 1, 2010, p. 10.
- 75 Transcript, November 3, 2010, p. 6.
- 76 Transcript, November 3, 2010, p. 52.
- 77 Exhibit 40, p. 7 and following.
- 78 Transcript, November 3, 2010, p. 8.
- 79 Exhibit 40, pp. 7–12.
- 80 Transcript, November 3, 2010, pp. 19–20.
- 81 Exhibit 48.
- 82 Exhibit 48, p. 3.
- 83 Exhibit 48, pp. 5–16.
- 84 Transcript, November 3, 2010, p. 25.
- 85 Transcript, November 3, 2010, p. 55.
- 86 Transcript, November 3, 2010, p. 53.
- 87 Robin Brown, Transcript, August 18, 2011, p. 71.
- 88 Transcript, November 3, 2010, p. 66.
- 89 Exhibit 55; Alan Cass, Transcript, November 3, 2010, p. 66.
- 90 Alan Cass, Transcript, November 3, 2010, pp. 66–67.
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- 107 Wendy Watson-Wright, Transcript, November 3, 2010, p. 30; Exhibit 48, p. 9.
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- 112 Transcript, May 5, 2011, pp. 16–18.
- 113 Transcript, September 23, 2011, p. 46.
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- 119 Robie Macdonald, Transcript, June 6, 2011, pp. 12–13, 46; John Carey, Transcript, June 7, 2011, pp. 78–80, 85; Sylvain Paradis, Transcript, June 7, 2011, p. 78.
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- 125 Chehalis, Exhibit 279, pp. 5–6; Heiltsuk, Exhibit 300, p. 3; Tl'azt'en, Exhibit 292, pp. 7–8; Siska, Exhibit 291, p. 3; Métis, Exhibit 298, p. 2. See also Gary Ducommun, Transcript, December 15, 2010, p. 47.
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- 130 Transcript, September 20, 2011, p. 98.
- 131 Transcript, October 28, 2010, p. 28.
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- 135 For example, David Welch, Stewart McKinnell, and Richard Beamish, Transcript, July 8, 2011, p. 61; Kristina Miller, August 25, 2011, pp. 35–36; Don MacDonald, May 10, 2011, p. 69.
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- 142 Exhibit 155A, p. 10.
- 143 Transcript, December 14, 2010, pp. 6–7.
- 144 Transcript, December 15, 2010, p. 13.
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- 146 Exhibit 291, p. 3.
- 147 Transcript, December 13, 2010, p. 9.
- 148 Exhibit 224, pp. iv–v.
- 149 Exhibit 155A, p. 12.
- 150 Transcript, September 28, 2011, p. 60.
- 151 Transcript, November 2, 2010, pp. 80–81.
- 152 Laura Richards and Paul Sprout, Transcript, November 4, 2010, pp. 113–14.
- 153 Exhibit 155A, p. 8.
- 154 Exhibit 223; Exhibit 298, pp. 2–3; Andrew Trites, Transcript, May 5, 2011, pp. 8–9.
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- 180 Susan Farlinger, Transcript, December 9, 2010, pp. 28–29.
- 181 Claire Dansereau, Transcript, September 23, 2011, p. 53.
- 182 Susan Farlinger, Transcript, September 23, 2011, p. 55.
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- 184 Susan Farlinger, Transcript, March 4, 2011, p. 66.
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- 198 Susan Farlinger, Transcript, December 16, 2010, pp. 7–8, March 4, 2011, pp. 65–66; Paul Macgillivray, Transcript, November 1, 2010, p. 90.
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- 203 Paul Macgillivray, Transcript, November 1, 2010, pp. 68–69; Jim Irvine, Transcript, December 1, 2010, pp. 74–75; Susan Farlinger, Transcript, September 27, 2011, p. 98.
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- 218 *Oceans Act*, SC 1996, c. 31, s. 29. See also the discussion of the *Oceans Act* in Chapter 3, Legal framework; Susan Farlinger, Transcript, December 16, 2010, p. 7.
- 219 Exhibit 263, p. 1.
- 220 Exhibit 783, p. 78.
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- 222 Transcript, August 31, 2011, p. 112.
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- 238 Exhibit 493; PPR 6, p. 66–67.
- 239 Exhibit 480.
- 240 Exhibit 269, p. 4.
- 241 Susan Farlinger, Transcript, December 16, 2010, p. 11.
- 242 Exhibit 269, p. 28.
- 243 Exhibit 269.
- 244 Exhibit 269, pp. 27–28.
- 245 Exhibit 270.
- 246 Paul Sprout, Transcript, December 16, 2010, p. 11. See also Exhibit 270, p. 6.
- 247 Exhibit 270, p. 6.
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- 250 Exhibit 263.
- 251 Susan Farlinger, Transcript, December 16, 2010, p. 19. See also Paul Macgillivray, November 1, 2010, pp. 68–69.
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- 264 Exhibit 429, p. 1.
- 265 This description of the Sustainable Fisheries Framework is taken from the DFO website, www.dfo-mpo.gc.ca.
- 266 Exhibit 51.
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- 269 Exhibit 8, p. 15.
- 270 Exhibit 185/207, pp. 1–2.
- 271 Exhibit 51, p. 2.
- 272 Exhibit 51, pp. 6–10.
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- 274 Exhibit 1940.
- 275 Exhibit 1940, p. 1.
- 276 Exhibit 1940, p. 2.
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Chapter 5 • Management of the Fraser River sockeye salmon fishery

■ Introduction

In this chapter of the Report, I describe the management of the Fraser River sockeye salmon fishery.¹

In many respects, the management of the sockeye fishery is extremely complex. Fraser River sockeye salmon are “harvested” (caught) in a number of fisheries as they migrate from their offshore ocean habitat in the North Pacific, through the Johnstone and Juan de Fuca straits, into the Strait of Georgia and up the Fraser River to the spawning grounds in the Fraser River watershed. The salmon travel through waters subject to the Pacific Salmon Treaty, an international treaty between Canada and the United States, as well as waters managed exclusively by the Department of Fisheries and Oceans (DFO). Because the co-management aspect of this fishery is unique, I will describe the management of the fishery under the Pacific Salmon Treaty by both DFO and the Fraser River Panel – which is part of the Pacific Salmon Commission. As the sockeye pass through these waters, they encounter test fisheries; commercial seine, troll, and gillnet fisheries;

recreational fisheries; Aboriginal food, social, and ceremonial (FSC) fisheries; and Aboriginal economic opportunity fisheries. I will describe each of these fisheries in turn and how DFO manages them, together with a description of the current allocation policies applied to these fisheries.

In order to manage the fishery, and as required by the Pacific Salmon Treaty, DFO must set forecasts and obtain information about the fish as they migrate (e.g., estimates of when the fish will return, the number of fish returning, and the number of fish required to reach the spawning grounds). Scientific modelling is necessary for these forecasts, and although it can be challenging for the layperson to understand, I have endeavoured to explain the practices comprehensively.

In 2005, DFO introduced its Wild Salmon Policy, which DFO’s senior management considers its guiding document for the management of salmon fisheries, including the Fraser River sockeye fishery. I have devoted Chapter 10 of Volume 1 to the Wild Salmon Policy and its implementation, and I touch on it where relevant in this chapter.

Several fishery management processes are particularly relevant to the Wild Salmon Policy: the Fraser River Sockeye Spawning Initiative (FRSSI), the Integrated Harvest Planning Committee (IHPC), and the Integrated Fisheries Management Plan (IFMP). These processes and their current operation are all reviewed in detail later in this chapter, and I address their relevance to the implementation of the Wild Salmon Policy in Chapter 10.

I have set out my recommendations regarding changes to DFO's management policies, practices, and procedures in Volume 3 of this Report.

Management by run-timing group

Four groups of Fraser River sockeye have been identified, based on the historical timing of their migration to their spawning grounds. The groups are referred to as run-timing groups (also called stock groups or management groups) and are identified

as the Early Stuart, Early Summer, Summer, and Late run-timing groups.² The run-timing groups are used in the management of the various Fraser River sockeye fisheries.

The four run-timing groups of Fraser River sockeye are further broken down or delineated by stock. The International Pacific Salmon Fisheries Commission, the predecessor to the Pacific Salmon Commission, identified 271 separate Fraser River sockeye spawning populations, based on the timing of their migration and the location of their spawning grounds.* Many of these 271 spawning populations have been aggregated (grouped) into 19 identified (named) stocks; the remaining spawning populations are listed as "miscellaneous" stocks, as set out in Table 1.5.1.

The Fraser River sockeye fishery is a mixed-stock fishery, meaning that a run-timing group will be made up of several different stocks and that run-timing groups overlap in space and time with each other, all of which can affect the management of

Table 1.5.1 Modelled stocks, miscellaneous stocks, and management groups

Management Group	Modelled Stocks	Miscellaneous Stocks
Early Stuart	Early Stuart	
Early Summer	Bowron Fennel Gates Nadina Pitt Raft Scotch Seymour	Early Shuswap, South Thompson North Thompson tributaries North Thompson River Nahatlach River & Lake Chilliwack Lake, Dolly Varden Creek
Summer	Chilko Late Stuart Quesnel Stellako	
Late	Cultus Harrison Late Shuswap Portage Weaver Birkenhead	Misc. non-Shuswap (Harrison Lake)

Source: Reproduced from Exhibit 400, p. 8.

* The Pacific Salmon Commission itself refers to eight stock identification groups for Fraser River sockeye, which are different from the four run-timing groups and the 19 identified stocks. See the explanation in PPR 5, Harvest Management, at paragraph 40 and, below, in the discussion of the Pacific Salmon Commission's pre-season planning.

each run-timing group and the fishery. The sockeye stocks are distinct from the sockeye Conservation Units (CUs) under DFO's Wild Salmon Policy.³

In managing the marine mixed-stock fishery, DFO tries to protect the weak stocks, which are typically stocks identified as weak in production. During his testimony on the Wild Salmon Policy, Dr. Brian Riddell, former head, Salmon and Freshwater Ecosystems, Science, DFO Pacific Region, and now chief executive officer of the Pacific Salmon Foundation, clarified that not all small sockeye stocks are "weak stocks," explaining that some small populations have been "fished down below what their full capacity is, and because they're at the lower end of their production range, they're quite productive. They have a high rate of production, so they are sustaining that current harvest rate."⁴ During the hearings, DFO managers referred to "weak stock management," which I understood to mean managing the Fraser River sockeye fishery in a way that attempts to conserve these weak stocks.

In the Wild Salmon Policy, sockeye (like other Pacific salmon) are grouped by Conservation Unit, which is defined as a "group of wild salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to re-colonize naturally within an acceptable timeframe."⁵ Fraser River sockeye CUs are not exactly the same as the sockeye stocks that historically have been used for management purposes. A stock may include more than one CU, and one CU may include more than one stock. Among the spawning populations, 251 are lake-rearing sockeye and make up about 31 CUs, while the remaining 20 are river-type sockeye and make up about seven CUs.⁶ For further explanation of Conservation Units, see Chapter, 10, Wild Salmon Policy.

Overview of the management of the Fraser River sockeye fishery

Within designated waters, Canada shares management of the commercial Fraser River sockeye salmon fishery with the United States through the Pacific Salmon Treaty.⁷ This international treaty, the successor to the *Convention for the Protection, Preservation and Extension of the Sockeye Salmon Fisheries of the Fraser River System*⁸ (1937 Convention) ratified in 1937, was signed by both countries in 1985 and subsequently amended. The

Pacific Salmon Treaty creates the Pacific Salmon Commission, which is directly involved in the management of the fishery.

Canada and the United States share the management of the Fraser River sockeye salmon general commercial fishery in the geographic area designated under the Pacific Salmon Treaty and known as the Panel Area waters. Both DFO and the Fraser River Panel of the Pacific Salmon Commission are involved in harvest management. DFO is responsible for the management of Canadian commercial fisheries in non-Panel Area waters in a manner consistent with the terms of the Pacific Salmon Treaty and for the management of all Aboriginal (FSC and economic opportunity) and recreational sockeye fisheries in both Panel Area and non-Panel Area waters. DFO conducts research and monitoring of Fraser River sockeye stocks and shares the information with the staff of the Fraser River Panel and the Pacific Salmon Commission.⁹

For both DFO and the Fraser River Panel, the management of the fishing of Fraser River sockeye follows an annual cycle of pre-season planning, in-season management, and post-season review.¹⁰ In the pre-season stage, DFO prepares models forecasting the abundance of the returning stocks, as well as forecasts of the timing and movement (diversion rate) of the four run-timing groups on their return to the Fraser River, and gives this information to the Fraser River Panel. Under the Pacific Salmon Treaty, DFO is responsible for providing spawning escapement targets to the Fraser River Panel. These targets are generated through DFO's Fraser River Sockeye Spawning Initiative (discussed below). During this period (and in the post-season stage), DFO meets with interested parties (commercial and recreational fishers, representatives of First Nations, and environmental non-government organizations) through its Integrated Harvest Planning Committee and in bilateral discussions with First Nations. DFO defines its management objectives and sets objectives for allocation of the Canadian total allowable catch (TAC) among the different fisheries.¹¹

Based on the forecasts provided to it by DFO, the Fraser River Panel prepares the pre-season fishing plan. DFO also prepares a fishing plan for salmon, the Integrated Fisheries Management Plan, which is approved by the minister of fisheries and oceans and distributed to the Pacific Salmon Commission for its use. Once the fishing season is

under way, the control of the commercial fishery in Panel Area waters shifts from DFO to the Fraser River Panel. The Pacific Salmon Commission's staff conducts in-season assessments of the fishery, using hydroacoustic monitoring and test fishing.

Once the season has finished, DFO generates post-season escapement estimates (the number of fish that "escape" the fishery and reach their spawning grounds) using a wide range of survey methods and analyses. DFO assesses the difference between estimates (explained in detail below) and a tally of the final run size. DFO reports to, and consults with, the IHPC and stakeholders, and the Fraser River Panel reports to the Pacific Salmon Commission.

■ The Pacific Salmon Commission and the Fraser River Panel

The 1937 Convention established the International Pacific Salmon Fisheries Commission (IPSFC). It had six members – three from each country – and employed permanent professional and technical staff. The 1937 Convention provided that the IPSFC would conduct scientific investigations for two life cycles of the sockeye (eight years) before it promulgated or enforced any regulations regarding the fishery.¹² Mike Lapointe, chief biologist of the Pacific Salmon Commission since 2002, testified that, at the time the IPSFC was formed, "the fishery had virtually collapsed." The IPSFC was given the mandate "to figure out what was going on," and it did so through natural history studies, tagging of fish, enumeration on the spawning grounds, investigations into all aspects of salmon life history, and looking for possible obstructions to migration in the Fraser River watershed.¹³

In 1946, the IPSFC began to regulate the fishery within the designated geographic area – the "Convention Waters."¹⁴ It managed the commercial fishery within the Convention Waters, allocating the total allowable catch equally between Canada and the United States.¹⁵ The IPSFC was responsible for establishing regulations to manage the fishery, although the 1937 Convention provided that the IPSFC would set up an advisory committee "composed of five persons from each country [later expanded to six] who shall be representatives of the

various branches of the industry ... which ... shall be invited to all non-executive meetings of the [IPSFC] and shall be given full opportunity to examine and to be heard on all proposed orders, regulations or recommendations."¹⁶ Although the IPSFC set the regulations, it was not empowered under the 1937 Convention to enforce them – that remained the responsibility of the individual countries.

On March 18, 1985, Canada and the United States signed the Pacific Salmon Treaty.¹⁷ It provides for the management by both countries of all salmon originating in the waters of one country which are subject to interception by the other, affect the management of the other country's salmon, or affect biologically the stocks of the other country.¹⁸

Annex IV to the Pacific Salmon Treaty contains a group of short-term management plans directed at six specific sets of fisheries. This annex has been amended by the parties four times since the Pacific Salmon Treaty was ratified. Chapter 4 of Annex IV governs the management of Fraser River sockeye (and pink salmon). As amended in 2005, the provisions of chapter 4 were to be in effect from 2005 through 2010, but, at the end of 2010, the chapter was amended to extend through 2012.¹⁹ Chapter 4 sets out the total allowable catch (explained in more detail below) and how it is calculated for each country's fisheries.²⁰

The Pacific Salmon Treaty stipulated that the IPSFC would be terminated on December 31, 1985.²¹ In 1986, the Pacific Salmon Commission (PSC) was created, and it is funded equally by Canada and the United States.²² The agreement of both countries is required for any recommendation or decision by the Pacific Salmon Commission.²³

Organizational structure of the Pacific Salmon Commission

The Pacific Salmon Commission is a 16-person body with four commissioners and four alternates for each country. They include persons involved in commercial and recreational fisheries, as well as federal, state, provincial, and First Nations governments.²⁴ The minister of fisheries and oceans appoints the four Canadian commissioners and the four alternate commissioners. Reporting to and assisting the commissioners are five committees and four panels, with subcommittees supporting

each panel. As set out in Figure 1.5.1, there are also two separate quasi-committees, the Northern Restoration and Enhancement Fund and the Southern Restoration and Enhancement Fund, which allocate research funds (see dotted line).²⁵ In addition to the committees and panels, the

Pacific Salmon Commission has permanent staff, with headquarters in Vancouver. The commission's committees are made up of members from both countries: they offer technical advice to the Pacific Salmon Commission and its panels and report directly to the Pacific Salmon Commission.

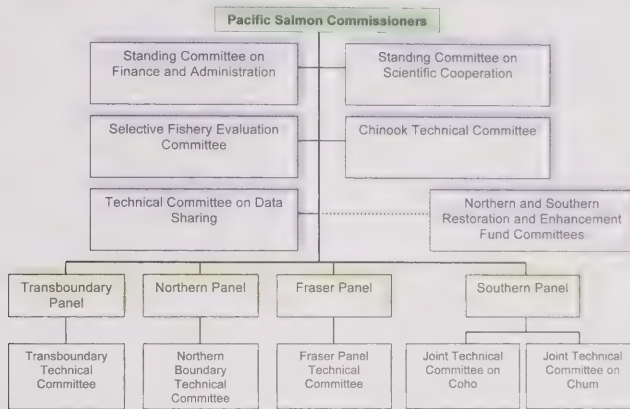


Figure 1.5.1 Pacific Salmon Commission organization chart

Source: Reproduced from Policy and Practice Report 4, Pacific Salmon Treaty, p. 16.

The Fraser River Panel

The Pacific Salmon Commission's panels provide technical and regulatory advice to the PSC and make recommendations on the management of the fisheries in their assigned geographic area.²⁶

Under the Pacific Salmon Treaty, the Fraser River Panel is responsible for in-season management of the commercial harvest (except for commercial fisheries conducted by First Nations) in the designated geographic area – the Panel Area.²⁷ A map showing the Panel Area is set out in Figure 1.5.2.²⁸

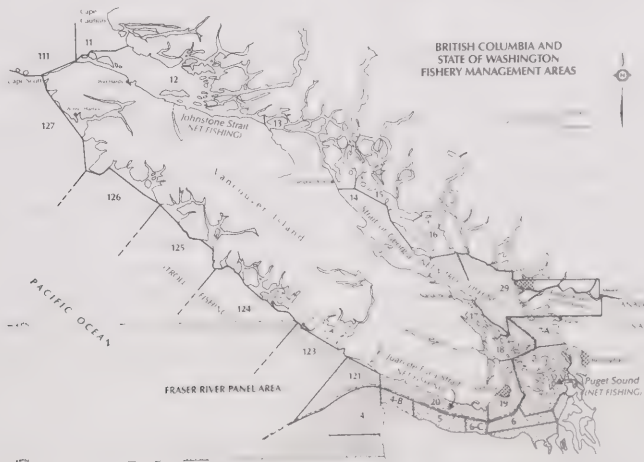


Figure 1.5.2 British Columbia and State of Washington fishery management areas

Source: Exhibit 74, p. 5.

As provided by Article II, paragraph 21, of the Pacific Salmon Treaty, the Fraser River Panel has six members and six alternate members from each country – individuals who come from government, various fishing sectors, First Nations, commercial harvest interests, and processors. Although the Canadian members are from different sectors, they represent Canada at the Fraser River Panel.²⁹ The chair of the panel and the vice-chair alternate each year between Canada and the United States, and they are each chair of their respective country's Fraser River Panel caucus.³⁰ DFO appoints the chair of the Canadian Caucus of the Fraser River Panel. The Canadian Caucus also has two observers from the Marine Conservation Caucus.³¹

The Fraser River Panel Technical Committee reports directly to the Fraser River Panel, providing it with the scientific data and analysis required for its management decisions.³² The Technical Committee is made up of 10 representatives, five from each country. Of the five Canadian members of the Technical Committee, four are DFO employees, and one is a consultant with the Fraser River Aboriginal Fisheries Secretariat. The Pacific Salmon Commission's scientific staff provide the Technical Committee members with scientific information and analysis, which the committee then provides to the Fraser River Panel.³³ Pacific Salmon Commission staff also provide advice and direction to the Fraser River Panel.

Pacific Salmon Commission staff

Both Donald Kowal, executive secretary of the Pacific Salmon Commission since 1989, and Mr. Lapointe testified at the hearings. As chief biologist, Mr. Lapointe is responsible not only for managing the biology staff but also for working closely with the Fraser River Panel and its Technical Committee to ensure that the panel has the information it requires and that the members understand the technical basis for the information they receive so they can make decisions about fishery openings and closings. The chief biologist considers fishery recommendations from each country to determine if they are consistent with the objectives of the Pacific Salmon Treaty (e.g., TAC or available fish). If the chief biologist agrees with a country's fishery recommendations, the fishery can go ahead over the other country's objection; however, if both countries agree, they can overrule the chief biologist's approval.³⁴

The Pacific Salmon Commission has 26 full-time staff and several summer staff who carry out fisheries-related monitoring activities and test fishing. It runs two technical programs related to the management of Fraser River sockeye: the Stock Monitoring Program (which assesses run size, daily abundance, and migration timing of returning stocks) and the Racial Analysis Program (which identifies the stock proportions of Fraser River sockeye in commercial, test, and First Nations catches).³⁵

Overview of commercial harvest management under the Pacific Salmon Treaty

Article IV of the Pacific Salmon Treaty outlines the general conduct of fisheries. Under Article IV, each country is required annually to submit preliminary information for the upcoming year to the Pacific Salmon Commission (and to the other country), including the estimated run size, the interrelationship among stocks, the required spawning escapement, the estimated total allowable catch, "its intentions concerning the management of fisheries in its own waters," and, if appropriate, its domestic allocation objectives.³⁶ Each country establishes and enforces regulations to implement the fishery regimes and must notify the Pacific Salmon Commission and the other country of these regulations and any in-season modifications to them.³⁷ Article IV of the treaty also provides that each country must submit an annual report "on its fishing activities in the previous year" to the other country and to the Pacific Salmon Commission. Annual reports are reviewed by the appropriate Pacific Salmon Commission panels, and the Pacific Salmon Commission then reports back to the respective country.³⁸

Article VI of the treaty modifies the provisions of Article IV with specific reference to Fraser River sockeye and pink salmon in the Fraser River Panel Area (which is set out in Annex II of the treaty, Fraser Panel Area). Once the countries have adopted the Pacific Salmon Commission fishery regime under Article IV (which is set out in Annex IV),³⁹ Article VI stipulates that it is the Fraser River Panel (and not the individual country) which proposes regulations to the Pacific Salmon Commission for the harvest of Fraser River sockeye and pink

salmon. Regulations are then recommended by the Pacific Salmon Commission to the parties for approval, and they become effective on approval by the country in whose waters the regulations are applicable.⁴⁰ Article VI also provides:

6. During the fishing season, the Fraser River Panel may make orders for the adjustment of fishing times and areas stipulated in the annual regulations in response to variations in anticipated conditions. The Parties shall review the orders for consistency with domestic legal obligations. The Parties shall give effect to such orders in accordance with their respective laws and procedures.

7. The Parties shall not regulate their fisheries in areas outside the area specified in Annex II in a manner that would prevent achievement of the objectives of the fishery regime for the salmon referred to in paragraph 1.

As noted earlier, Annex IV of the treaty contains the fishery regimes agreed to by the parties under Article IV, and chapter 4 of Annex IV specifically applies to Fraser River sockeye and pink salmon. In chapter 4, the total allowable catch for each country is defined and allocated; paragraph 4 of chapter 4 expressly places the onus on Canada to establish spawning escapement targets for the purpose of calculating the annual TAC. It also states: “For the purposes of pre-season planning, where possible, Canada shall provide forecasts of run size and spawning escapement requirements by stock management groupings to the Fraser River Panel no later than the annual meeting of the Commission.”⁴¹

In his testimony, Mr. Lapointe explained TAC and how it is calculated under the provisions of chapter 4 of Annex IV:

Paragraph 3 ... [tells] how it's calculated ... total allowable catch for international sharing purposes is calculated by taking the total return of Fraser River sockeye and subtracting a number of deductions, [which] ... include spawning escapement targets; the management adjustment ... the agreed aboriginal fisheries exemption; and any expected catches and panel-approved test fisheries. [TAC is] ... total run minus spawning escapement minus test fisheries ... That is used

to apply the percentage shares in paragraph 2 to determine the shares that each country would be entitled to.⁴²

On approval of the pre-season plan and during the in-season period of Fraser River Panel regulatory control, all commercial sockeye fisheries in Panel Area waters are closed unless they are opened for fishing by in-season order of the Fraser River Panel.⁴³ The in-season decision-making process to be followed by the Fraser River Panel is expressly set out in paragraph 13 of chapter 4 of Annex IV and is discussed in greater detail below.

The Fraser River Panel's annual reports contain appendices setting out the regulations for each year's fishing season. These regulations are submitted at the end of June by the Pacific Salmon Commission to Canada and the United States.⁴⁴ Regulatory recommendations for Canadian waters are implemented under the federal *Fisheries Act* as part of the Canadian legislative regime for the licensing, openings and closings, and enforcement of the fisheries.

■ DFO Fraser River sockeye fisheries management structure

DFO is organized around a functional matrix model; fisheries management falls under the national Fisheries and Aquaculture Management (FAM) sector* and its equivalent regional branch (for an explanation of DFO's national sectors and regional branches, see Chapter 4, DFO overview). DFO Science staff working in the regional Science Branch offices, as well as those working in the area offices, are also involved in sockeye harvest management.⁴⁵ Within DFO's Pacific Region, several entities have been created which share responsibility for various aspects of the management of the commercial Fraser River sockeye harvest,⁴⁶ although the focus is on DFO, reference to the interaction between DFO and the Fraser River Panel is noted. DFO's Conservation and Protection staff are also involved in fisheries management through the department's compliance and enforcement programs.

* Renamed Ecosystems and Fisheries Management in the spring of 2010. For this Report, the sector will be referred to as FAM.

Salmon Team

The Salmon Team is made up of a small group of employees from the Pacific Region's FAM Branch.⁴⁷ The Salmon Team is responsible for drafting salmon IFMPs; it signs off on salmon fisheries notices and is involved in the salmon IHPC. It also develops and implements policy with respect to Pacific salmon, which includes DFO's Wild Salmon Policy. The members of the Salmon Team are its lead, the regional salmon coordinator (also called the regional salmon resource manager or the regional resource manager, Salmon), the regional recreational coordinator, and the salmon officer. The Salmon Team lead reports to the regional director of FAM, who reports to the regional director general of the Pacific Region.

Salmon Working Group

Although the Salmon Team is a discrete group within the Pacific Region's FAM Branch, the Salmon Working Group is a broader Pacific Region forum for the coordination of salmon planning and review activities and the integration of salmon management activities among the region's area offices.⁴⁸ It identifies policy needs and provides recommendations for improvements to salmon management programs, including the implementation and integration of agreements under the Pacific Salmon Treaty. It recommends research to the Centre for Science Advice, Pacific (CSAP) Salmon Sub-Committee (see below), as well as other research programs carried out by DFO or other agencies or universities, and, in turn, will review and implement the scientific advice it receives. Where the Salmon Team pulls together the information for the IFMP, the Salmon Working Group coordinates the development of the IFMP, including establishing related time frames and consultation processes.

The Salmon Working Group meets in November to review the season and begin pre-season planning; in March or April to finalize the IFMP; and in June to finalize plans for the upcoming season and discuss outstanding policy issues. The Salmon Working Group has a number of subcommittees, including the Stock Assessment Coordination Committee (see below).

Fraser River Sockeye and Pink Salmon Integrated Management Team

DFO's Fraser River Sockeye and Pink Salmon Integrated Management Team⁴⁹ (often referred to as FRIMT) is the administrative group that manages Fraser River sockeye and pink salmon for Canada. It works closely with the Fraser River Panel and provides overall direction to the three DFO area offices that manage Fraser River sockeye (South Coast, Lower Fraser, and BC Interior). The team's specific responsibilities include providing direction on the implementation of regional, national, and Pacific Salmon Treaty policies (e.g., licensing, regulations, stock assessment, and catch monitoring), coordinating the implementation and integration of management strategies (area-based, regional, and under the Pacific Salmon Treaty), implementing scientific advice, and coordinating the development of management plans in the IFMP.

Before Fraser River Panel meetings, the team coordinates with all DFO programs that provide input into the management of Fraser River sockeye. The linkage from the Integrated Management Team to DFO's Salmon Team is through the Salmon Team's salmon officer.

Membership of the team is completely internal to DFO. The core members include the Fraser River Panel's Canadian chair and alternate chair; area chiefs of Resource Management and Conservation and Protection; area directors for the South Coast, Lower Fraser, and BC Interior; the lead of the Salmon Team; the regional salmon officer; other FAM Resource Management staff as needed; and DFO's Fraser River Panel Technical Committee members. Other staff members are invited to attend as required, and may include people from FAM at national headquarters, the regional salmon resource manager, the regional salmon recreational fisheries coordinator, a representative from the Oceans, Habitat and Enhancement Branch (OHEB),* and the area chiefs of Stock Assessment.

* As of April 2011, it was renamed the Ecosystem Management Branch, but for the purposes of this Report it will be called the Oceans, Habitat and Enhancement Branch (OHEB).

Within DFO, the team is responsible for Fraser River sockeye and pink fisheries management in Panel Area and non-Panel Area waters. This task includes responsibility for commercial, recreational, FSC, First Nations economic opportunity, and treaty fisheries. The Integrated Management Team meets in November to develop a post-season report and to begin planning for the coming year; it also meets in March or April to work on pre-season fishing plans. In season, the team meets by conference call as required, generally before and after the Fraser River Panel and its Technical Committee meetings.

The Canadian chair of the Fraser River Panel is also the Integrated Management Team chair. This individual reports to the regional director of FAM and the area directors of the South Coast, Lower Fraser, and BC Interior. The Fraser River Panel's Technical Committee Canadian co-chair reports to the Canadian chair of the Fraser River Panel / Integrated Management Team on the work of the Technical Committee. The Fraser River Panel Canadian Caucus (or National Section) and the DFO Integrated Management Team meet periodically as well.

DFO's structure for management of Aboriginal fisheries

According to DFO, 146 *Indian Act* bands receive licences and allocations to harvest Fraser River sockeye salmon.⁵⁰ As described above, DFO's Integrated Management Team is responsible for the management of the Aboriginal FSC and economic opportunity fisheries – the Fraser River Panel does not manage them (although they may occur in Panel Area waters). In 1993, the federal government promulgated the *Aboriginal Communal Fishing Licences Regulations* under the *Fisheries Act* (discussed in more detail below), and at the same time, DFO developed and implemented its Aboriginal Fisheries Strategy. Under this strategy, DFO negotiates with and enters into agreements with First Nations regarding their fisheries – a role separate and apart from the management engaged in by the Integrated Management Team. DFO's approach to Aboriginal fisheries is explained in greater detail in the Aboriginal fishing policies and programs section below.

Stock Assessment Coordination Committee

The Stock Assessment Coordination Committee is the group responsible for the regional coordination of priorities for DFO's stock assessment work throughout the region, including the Fraser River.⁵¹ It is given a budget target and generates a program profile to fit it. The committee is made up of area chiefs for Stock Assessment from all DFO areas, core Science members (e.g., the head, Salmon Assessment, and the division head, Salmon and Freshwater Ecosystems), representatives from OHEB and the Salmonid Enhancement Program, representatives from FAM, and DFO's Pacific Salmon Treaty coordinator. Area chiefs of Resource Management are sometimes involved with the Stock Assessment Committee. The division head of Salmon and Freshwater Ecosystems has the ultimate authority for advising the Regional Management Committee on behalf of the Stock Assessment Committee.

Centre for Science Advice, Pacific, Salmon Sub-Committee

In the Pacific Region, the Centre for Science Advice, Pacific is the organization within DFO responsible for the review and evaluation of scientific information on the status of living aquatic resources, their ecosystems, and the biological aspects of stock management (see Chapter 4, DFO overview). The CSAP Salmon Sub-Committee is the primary body providing pre-season scientific advice for the development of management plans for Pacific salmon. CSAP operates through a peer-review process; its membership is largely DFO scientists, with participants from other DFO sectors, academia, First Nations, stakeholders, other government or private institutions, and the public. Requests to CSAP for science advice from within DFO are passed on to the Regional Management Executive Committee to determine whether there are overlaps in projects. This committee decides how resources should be provided to meet science advice requirements (according to the priorities it has determined) and approves CSAP requests. The Regional Management Executive Committee is made up of senior management from Science, FAM, and OHEB.

Findings

The management structure of the Department of Fisheries and Oceans (DFO) for the Fraser River sockeye fishery is complex. However, I heard no evidence critical of this aspect of DFO's organizational structure. Later in this chapter I discuss the concerns about DFO's management in relation to the Integrated Harvest Planning Committee and the Integrated Fisheries Management Plan.

■ The regulation of the fisheries: licensing

Access to the fisheries

In order to fish for Fraser River sockeye, a person is required to hold a licence or be designated under an Aboriginal communal fishing licence.⁵² As noted in Chapter 3, Legal framework, the *Fisheries Act* affords the minister the authority to license the fishing of Fraser River sockeye.⁵³ The minister may charge fees for licences and, in certain circumstances, may suspend or cancel licences.⁵⁴

The *Fisheries Act* also allows the Governor in Council to make regulations “respecting the issue, suspension and cancellation of licences and leases” and “respecting the terms and conditions under which a licence and lease may be issued.”⁵⁵ The *Fishery (General) Regulations*⁵⁶ govern the operation of the fisheries and apply to all fisheries (with certain exceptions for licences issued under the *Aboriginal Communal Fishing Licences Regulations*).⁵⁷ These regulations contain provisions regarding the establishment and variation of fishery closures, fishing quotas, fish size and weight limits, licences and registration, identification of fishing vessels and fishing gear, and fishery observers.

The *Pacific Fishery Management Area Regulations, 2007*,⁵⁸ describe the surf line and divide the Canadian fisheries waters of the Pacific Ocean into management areas and sub-areas, which in turn are referenced when describing fishery openings and closures, as set out in Figure 1.5.3.

The *Aboriginal Communal Fishing Licences Regulations*⁵⁹ authorize the minister to issue a communal licence to an Aboriginal organization,

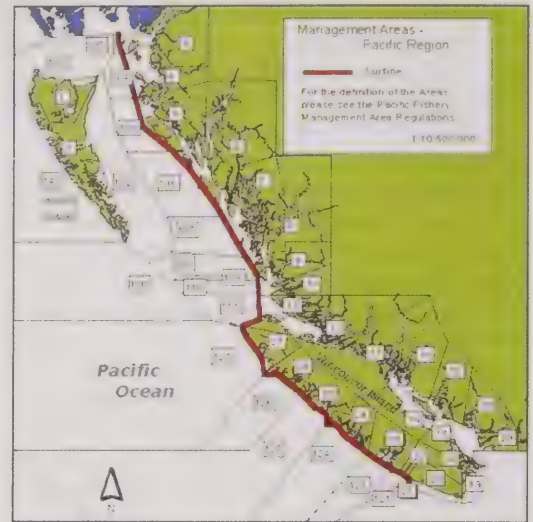


Figure 1.5.3 Management areas – Pacific Region

Note: For definitions of the areas, see the *Pacific Fishery Management Area Regulations, 2007*.

Source: Policy and Practice Report 6, Commercial Sector Licensing, Appendix B.

a term that includes “an Indian band, an Indian band council, a tribal council, and an organization that represents a territorially based aboriginal community.”⁶⁰ These regulations apply to fisheries in the areas enumerated in Schedule 2 to the *Pacific Fishery Management Area Regulations, 2007*, and to salmon fisheries in British Columbia; however, they do not apply to fishing in national parks.⁶¹

The *Pacific Fishery Regulations, 1993*,⁶² apply to commercial fisheries (with Part VI governing the salmon fishery). The *British Columbia Sport Fishing Regulations, 1996*,⁶³ apply to sport fishing in Canadian fisheries waters of the Pacific Ocean and British Columbia, setting close times, fishing quotas, and size limits for all sport fisheries in the province.

Both the federal and the provincial governments are involved in licensing anglers. The split between the two is based on tidal and non-tidal waters. Canada issues tidal licences, and the province issues non-tidal licences. The line between tidal and non-tidal waters for the Fraser River is drawn at the downstream side of the CPR bridge at Mission.

The British Columbia *Fisheries Act*⁶⁴ mandates that an individual must not fish or attempt to fish “unless the person holds a valid licence issued for that purpose and has paid the fee prescribed.” The provincial *Wildlife Act*⁶⁵ states a similar requirement (to hold a valid licence) in order to fish in non-tidal waters. Although the provincial regulations apply primarily to freshwater species (rather than salmon), when freshwaters are closed to fishing or have gear restrictions imposed under the regulations, those restrictions also apply to fishing for salmon in non-tidal waters.

Licensing of the commercial fishery

The commercial salmon fishery in British Columbia is a limited-entry fishery, which means that no new licences are created.⁶⁶ The only way to acquire a commercial licence is to purchase one from a current licence holder, but there is a limited market for commercial licences. In recent years, the biggest “buyer” has been the federal government through licence buy-back programs.⁶⁷

There are currently two categories of commercial salmon licences: Category A and Category N.⁶⁸ These licences are issued to vessels.⁶⁹ Category A licences, the main category, are distributed across gillnet, seine, and troll vessels. Category N licences are issued only to the Northern Native Fishing Corporation.* Before the mid-1990s, each vessel participating in the fishery had a single licence,

which entitled the licence holder to fish anywhere in the province.⁷⁰ This system was referred to as a “coast-wide fishery.”

Area-based commercial licensing and the Mifflin Plan

In March 1996, Canada introduced the Pacific Salmon Revitalization Strategy, known as the Mifflin Plan after the Honourable Fred Mifflin, the minister of fisheries and oceans (see Chapter 4, DFO overview). The Mifflin Plan included a federally funded voluntary licence retirement, or buy-back program, aimed at reducing the fleet and introduced single-gear licensing and area-based licensing.⁷¹ Lisa Mijacika, DFO’s former acting chief of the Pacific Fishery Licensing Unit and its acting manager of business and client services (the Pacific Region unit responsible for commercial licensing), stated that one of the objectives of the Mifflin Plan was to align the makeup of the fleet with available harvest opportunities and the decline in the stocks.⁷²

For commercial licensing purposes, British Columbia is split into two regions – the North Coast and the South Coast – which are further broken down into areas.[†] In each area, commercial fishing occurs only by way of a specific gear type and within set geographic bounds. Only the South Coast commercial fleet receives a fishing allocation of Fraser River sockeye. The area names and gear types, by region, are listed in Table 1.5.2.

Table 1.5.2 Commercial fishing areas and gear types

North Coast Region		South Coast Region	
Area A	Seine	Area B	Seine
Area C	Gillnet	Area D	Gillnet
Area F	Troll	Area E	Gillnet
		Area G	Troll
		Area H	Troll

Source: Policy and Practice Report 6, Commercial Sector Licensing, para. 32.

* The Northern Native Fishing Corporation (NNFC) was established in 1982 when BC Packers Ltd. sold 243 vessels and 252 licences to the NNFC. The minister created this special category of N licences, which the NNFC could sell to individual First Nations fishers. PPR 6, Commercial Salmon Fishing, para. 24 and n. 39; see also Lisa Mijacika, Transcript, March 15, 2011, p. 72.

† At the time the Mifflin Plan was implemented, licence holders had to designate the area (and gear type) in which they wanted to fish. Chris Ashton, Transcript, February 22, 2011, p. 54; Lisa Mijacika, Transcript, March 15, 2011, p. 46.

A commercial licence holder is entitled to a limited opportunity, when that particular fishery is “open,” to fish for the designated species in accordance with whatever conditions are attached to the licence. The licence conditions set out parameters related to the operation of the vessel and other requirements associated with the fishery, such as the harvest limits and maintaining a harvest log.⁷³ Schedule VI of the *Pacific Fishery Regulations, 1993*, sets out the “salmon close times” for all areas and sub-areas, all species of salmon, and all gear types: for all of them, they are January 1 through December 31.⁷⁴ The salmon fishery is therefore always closed unless there is a variation allowing an opening.⁷⁵

Description of areas and gear types

Jeff Grout, regional resource manager, Salmon Team, DFO,* reviewed the current size of the fleet and set out the methods employed by the different gear types.⁷⁶ His description of each licence area and gear type follows the relevant map(s), with a discussion of the “mortality rates” for each gear type. The mortality rate refers to the inadvertent catching during the sockeye fishery of other species of salmon, which may then be released alive, depending on the type of fishing gear used (see the section on selective fishing below).⁷⁷

Mr. Grout testified that, in Area B, a seine fishery, for example, there are 168 licences in all (see Figure 1.5.4). The seine net is a large net that circles a school of fish and is then pursed at the bottom; the fish are dipped out of the seine net using a brailer (a long-handled net). He said that the release mortality rate for non-target species is approximately 25 percent in the seine fishery.



Seiner, Prince Rupert, BC, 2010

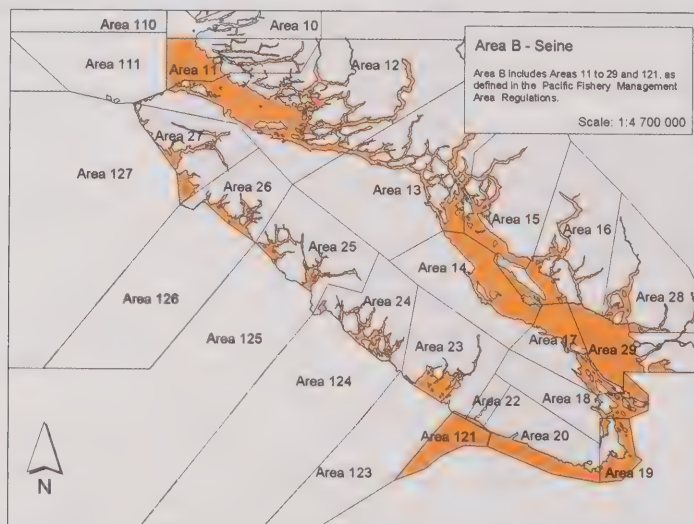


Figure 1.5.4 Area B – Seine

Source: Policy and Practice Report 6, Commercial Sector Licensing, Appendix B.

* Also referred to as regional salmon coordinator or as regional salmon resource manager.

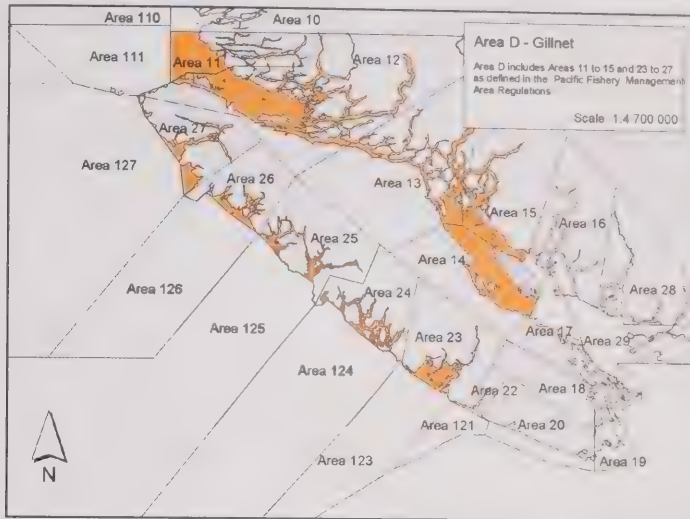


Figure 1.5.5 Area D – Gillnet

Source: Policy and Practice Report 6, Commercial Sector Licensing, Appendix B.

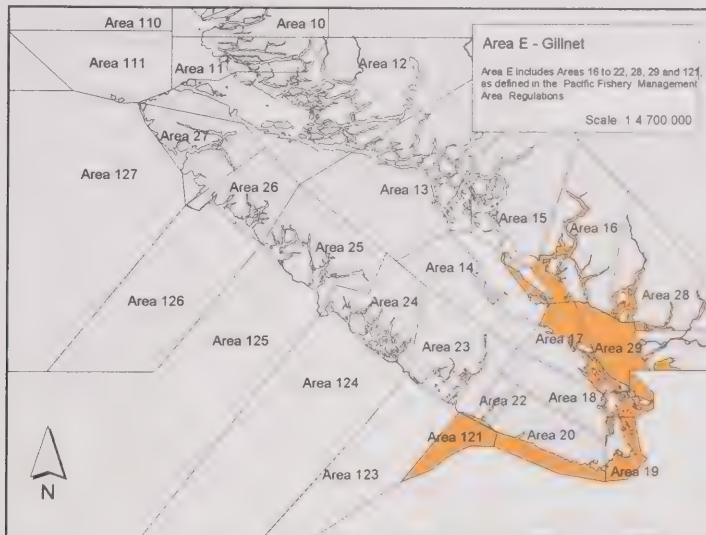


Figure 1.5.6 Area E – Gillnet

Source: Policy and Practice Report 6, Commercial Sector Licensing, Appendix B.

Mr. Grout testified that there are 355 licences in Area D and 393 licences in Area E, all of which use gillnets – rectangular nets hanging in the water that catch fish by enmeshing their

gills in the net (see figures 1.5.5 and 1.5.6). Mr. Grout testified that DFO typically applies a release mortality rate of 60 percent to the gillnet fishery.

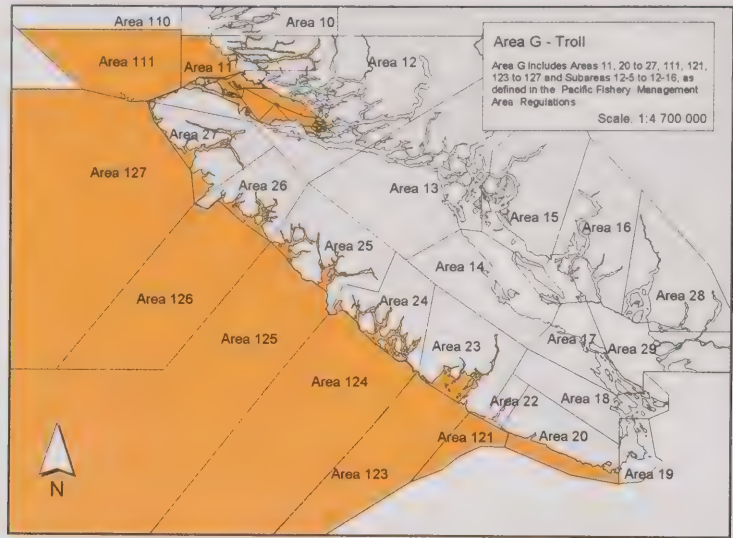


Figure 1.5.7 Area G - Troll

Source: Policy and Practice Report 6, Commercial Sector Licensing, Appendix B.

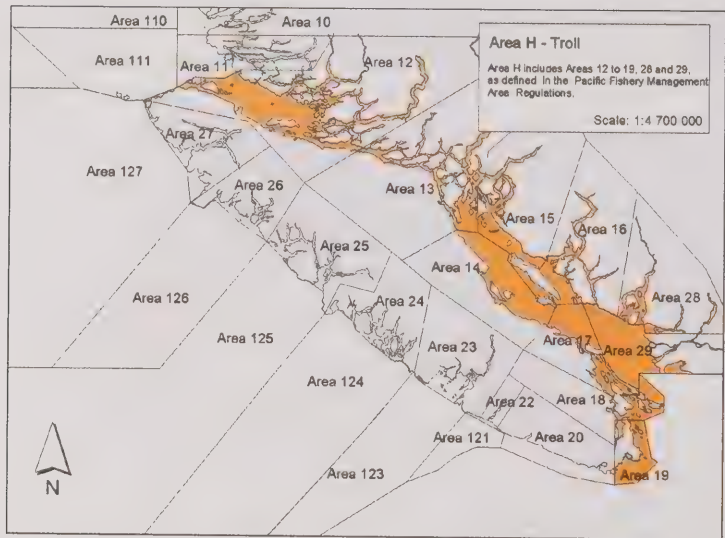


Figure 1.5.8 Area H - Troll

Source: Policy and Practice Report 6, Commercial Sector Licensing, Appendix B.

Mr. Grout testified that there are 165 licences in the Area G troll fleet and 89 licences in the Area H troll fleet (see figures 1.5.7 and 1.5.8). In the troll fishery, poles with lines with numerous hooks and

lures are lowered into the water, and the fish are individually hooked. The release mortality rate using troll gear is 15 percent for coho and chinook and 10 percent for sockeye.

Commercial licence fees

The current fees for commercial licences were set in 1998;⁷⁸ the fees have remained constant since then, although the prices for salmon have dropped and the fishery has declined. Ms. Mijacika testified that DFO began to review licensing in 2007, “to align [it] more with the current market and economic conditions and resource conditions of the fisheries.”⁷⁹ She acknowledged, however, that there are challenges to implementing changes to the fee structure:

[A] comprehensive package has been presented to the Minister to consider some options on how to restructure the fees to make them more balanced across all the different fisheries. What would have to happen, though, is there would have to be approval for that and then corresponding regulation changes would have to be made to implement those proposals and extensive consultations would be required with those that are affected, and under the *User Fee Act* there’s also separate regulatory requirement that the Department would have to meet to ensure that we’ve adequately consulted and looked at the impact of making those fee changes.

...

[The process] hasn’t taken place in a formal way other than through our existing advisory boards. A number of fisheries have asked for the status of this particular initiative and why it’s not moving, because of their concerns about fees not being aligned with what their current revenues are. It is ... an inequity in our current structure, and so there’s been a lot of pressure on us, but still, there hasn’t been a decision made by the Minister that we can move forward on.⁸⁰

Ms. Mijacika also testified that DFO does not have the authority to waive fees and would require that authority through the Treasury Board:

We also don’t have the authority to remit or refund existing fees that we’ve collected because it results in a revenue shortfall which we are then required to absorb, so we also don’t have a budget or a specific program set aside for that purpose. So a specific request would have to be made to [the] Treasury Board to do that. That’s one reason.

Another reason is there’s this interest ... in a number of fisheries where they’re seeing declines in their revenue ... or in their markets or their access to markets. So applying a fairness principle, we would have to look at how this would be applied to a number of different fisheries to make them more in balance with what’s happening in the current circumstances of the fishery.⁸¹

Ms. Mijacika told me that the Treasury Board withholds or holds back a certain portion of DFO funds until DFO deposits the same amount into the Consolidated Revenue Fund through collection of licence fees, at which time the Treasury Board will release funds to DFO to spend on programs. However, according to Ms. Mijacika, DFO has been falling short of its target for several years and, accordingly, is not receiving its full allotment to spend on programs.⁸²

Licensing of Aboriginal fisheries

As described above, the minister may issue communal fishing licences to Aboriginal organizations under the *Aboriginal Communal Fishing Licences Regulations*, which provides a licensing mechanism for fishing for both food, social, and ceremonial reasons and as an economic opportunity under DFO’s Aboriginal Fisheries Strategy.⁸³ In these licences, the minister may designate the persons who may fish and the vessels that may be used.⁸⁴ If the minister does not designate the persons or the vessels that may fish under the authority of the licence, the Aboriginal organization receiving the communal licence may do so.⁸⁵

Ms. Mijacika described the nature of the communal commercial licence and how it differs from a commercial salmon licence. She described it as “party-based,” in that the licence is not issued to a particular vessel but, rather, in relation to a contribution agreement with the First Nation whereby the First Nation must designate a vessel that meets the length restrictions set out in the licence.⁸⁶ She said that, although some fees may be involved (related to a business plan or arrangements made under the Pacific Integrated Commercial Fisheries Initiative [PICFI] program), no annual licence fees are attached to a communal licence.⁸⁷

Aboriginal communal fishing licences may contain conditions and restrictions where necessary “for the proper management and control of fisheries and the conservation and protection of fish.”⁸⁸ In particular, the minister may, in a licence, specify conditions respecting any of the matters set out in paragraphs 22(1)(b) to (z.1) of the *Fishery (General) Regulations* and any conditions respecting any of the following, without restriction:

- species and quantities of fish taken or transported
- designation requirements
- identification of fishing vessels and gear
- locations and times of landing fish
- methods for landing fish and quantification of fish
- reporting of fishing activities
- locations and times of inspections of fishing vessels
- maximum number of designated persons or vessels
- type, size, and quantity of fishing gear
- marking of fish for scientific or administrative purposes
- disposition of fish caught⁸⁹

Policies guiding DFO’s issuance of communal licences

DFO issued its Policy for the Management of Aboriginal Fishing in 1993 to guide the implementation of its Aboriginal Fisheries Strategy and to reflect the Supreme Court of Canada’s decision in *R. v. Sparrow*.⁹⁰ The Policy for the Management of Aboriginal Fishing provides that, “to ensure conservation,” all communal licences shall, as a minimum, contain the following provisions or terms and conditions:

- An allocation to the Aboriginal fishery for each species or stock to be fished for which other fisheries have “limited access” or are “quota-limited.”
- Provision for the designation of individuals by the Aboriginal Fishing Authority to fish under the agreement or licence.
- A form of identification to be carried by all designated individuals as evidence of their authority to fish.

- Provision for monitoring, by the Aboriginal Fishing Authority in co-operation with DFO, of the catch by designated individuals sufficient to ensure that the aggregate harvest does not exceed the allocation.
- A maximum limit on the number of individuals who may be designated to fish and on the type and amount of gear to be used by those individuals.⁹¹

In May 1998, DFO developed a Pacific Region *Communal Licence Handbook* to “describe and standardize the licensing process” and to “allow communal licences to be drafted, reviewed and issued efficiently and effectively.”⁹² Building on the Policy for the Management of Aboriginal Fishing, the handbook states that “DFO attempts to attain mutually agreeable arrangements that facilitate effective fishery activities. It is understood that these arrangements are reflected in the communal licences.”⁹³ However, where an agreement cannot be made, it is DFO’s policy to issue a communal licence to provide access for FSC purposes.⁹⁴ The *Communal Licence Handbook* describes the types of communal licences (or templates) that DFO has developed to fit particular circumstances. These licences include the following:

- *Single Species*: This template is used to license fishing of a single species, typically salmon. It is used to license all fisheries on the Fraser River.
- *Multi-Species*: This template uses separate schedules to license fishing for a number of different species – for example, salmon, herring, and shellfish. Typically it is used in the North Coast and South Coast divisions.
- *Supplemental*: This licence is required when food fishing occurs outside of the area described in the communal licence. It is approved when it is not possible to achieve the required harvest under the existing communal licence.
- *Dry rack*: This licence is used exclusively for First Nations that are fishing in the Fraser Canyon.
- *Ceremonial*: This licence may be issued when fishing is restricted or prohibited due to management reasons when local stocks cannot support an open fishery but may not be threatened by limited effort. It is intended

to allow fishing for ceremonial purposes only. Ceremonial licences are used almost exclusively in the Lower Fraser River.

- *Interim:* This type of licence is generally issued to Aboriginal organizations pending completion of negotiations. After issuing the interim licence, any changes to that communal licence necessitated by subsequent negotiations would be addressed by way of amendments to the licence.⁹⁵

Communal licences can be issued from either the division offices or from the field offices of DFO.⁹⁶ The Aboriginal Fisheries Branch (now the Aboriginal Policy and Governance Branch) must consult with FAM and the Conservation and Protection branches before producing a licence, and legal counsel may review the licence if it contains unique conditions or raises other legal issues.⁹⁷ Communal licences must be signed by a fishery officer.⁹⁸

In February 2001, DFO developed “Guidelines Respecting the Issuance of Licences under the *Aboriginal Communal Fishing Licences Regulations*” (the ACFLR Guidelines).⁹⁹ According to the ACFLR Guidelines, their purpose is to “confirm the approach that DFO has taken since the ACFLR were enacted in June 1993.”¹⁰⁰ The ACFLR Guidelines apply wherever the minister issues communal licences under the regulation.

The ACFLR Guidelines reiterate that the issuance of a communal licence under the regulations is not recognition that a particular Aboriginal group has an Aboriginal or treaty right to fish but, rather, is a tool that assists in the management of the fisheries and the conservation of fisheries resources to promote stability in fisheries.¹⁰¹ Where an agreement is reached, the licences issued will reflect the fisheries access and licence conditions described in the agreement. Where an agreement is not reached, the minister will review the consultations held and take into account the preferences and concerns expressed by the Aboriginal organization, conservation requirements, and other matters. Communal licences issued would then contain conditions that the minister believes would meet the requirements of *Sparrow* and subsequent court decisions and that are required for the proper management and control of fisheries and the conservation and protection of fish.¹⁰²



Drift net fishing, Fraser River, Cheam, BC, 2010

It is DFO's policy that, within communal licences, fishing for FSC purposes should take place within the “areas that were used historically by the aboriginal group.”¹⁰³ DFO has internal guidelines, “DFO's Guidelines for Responding to Requests by Aboriginal Organizations to Fish for Food, Social and Ceremonial (FSC) Purposes in Areas Not Previously Authorized Under Communal Licences Issued by DFO to the Aboriginal Organization for FSC Purposes,” which state that, where an Aboriginal individual wishes to fish for FSC purposes in a historical area of another Aboriginal group, that person may do so under that Aboriginal group's communal licence pending consent of that group.¹⁰⁴ Barry Rosenberger, area director, BC Interior, DFO, testified that this policy is one of long standing with the DFO: it is an attempt to reflect the fact that First Nations, through the land-claim treaty process, assert rights and titles to certain areas and that, in the past, they have expressed significant concerns that DFO has infringed on their rights in their territories by providing licences that allow Aboriginal individuals to fish for FSC purposes wherever they choose.¹⁰⁵

Licensing of the recreational fishery

A recreational fisher must hold a licence issued by the federal government to fish for salmon in British Columbia's tidal waters.¹⁰⁶ A recreational fishing licence permits fishing for salmon, but not the

retention of any salmon (to keep salmon, there is a further requirement, discussed below). DFO does not require a licence holder to have any special training to obtain a recreational fishing licence;¹⁰⁷ however, Devona Adams, regional recreational fishery coordinator, DFO, and Jeremy Maynard, former chair of the Sport Fishing Advisory Board, agreed that some education and/or training for recreational fishers before they obtained a licence would be helpful.¹⁰⁸

To retain salmon, anglers must also have a salmon conservation stamp affixed to their licences, whether tidal (federal) or non-tidal (provincial). Conservation stamps for tidal-water anglers are authorized under the *British Columbia Sport Fishing Regulations*, 1996.¹⁰⁹ For provincially issued non-tidal angling licences, there is an equivalent program: the provincial salmon conservation stamp. To keep a salmon of any legal size or species from non-tidal waters, an angler must have a Non-Tidal Salmon Conservation Surcharge Stamp (it is not required for anglers who will release all salmon caught). There must also be an opening for that species at the time it is caught.

In the commercial fishery, the conditions attaching to a particular licence type may be numerous; by contrast, recreational licences do not attach as many conditions – there are only four conditions. DFO communicates applicable restrictions and regulations to recreational fishers mainly by the published *Sport Fishing Guides*, which are then supplemented by Fishery Notices. Two *Sport Fishing Guides* relevant to salmon are produced every other year by DFO: the *Tidal Waters Sport Fishing Guide*¹¹⁰ and the *British Columbia Freshwater Salmon Supplement*.¹¹¹

Recreational licence fees

All recreational fishing licences require the payment of fees, as does the acquisition of conservation stamps (both for tidal and non-tidal licences). The fees are set out in a table under the *Sport Fishing Regulations*,¹¹² and the table is also reproduced in the *Tidal Waters Sport Fishing Guide*.¹¹³ The recreational licence fees were last raised in the mid-1990s.¹¹⁴ Recreational fishing representatives told me that the recreational fishing sector would like to see an increase in recreational licence fees, on the condition that the increased fees be earmarked for

DFO to spend on programs to benefit recreational fishing.¹¹⁵ Ms. Adams said that no specific fee review is under way and that, given the provisions of the federal *User Fees Act*,¹¹⁶ it is difficult to increase licence fees. In addition, DFO is not guaranteed to receive money back from the Treasury Board for specific programs (the fees received by DFO for licence purchases would go into general government revenue).¹¹⁷

Findings

The current fees for commercial licences have remained unchanged since 1998, although the prices for salmon have dropped and the fishery has declined. The evidence indicates that the Department of Fisheries and Oceans (DFO) would like to respond to fishers' desire to adjust commercial licence fees to reflect the market reality.

All recreational fishing licences require the payment of fees, which were last raised in the mid-1990s. Recreational fishing representatives told me that the recreational fishing sector supports an increase in its fees, provided that the increased fees are earmarked for programs to benefit recreational fishing.

The minister issues communal fishing licences to Aboriginal organizations, and they provide a licensing mechanism for food, social, and ceremonial fishing and for economic opportunity fishing. DFO does not charge licence fees for these communal licences for either type of fishery.

Under section 8 of the *Fisheries Act*, the Governor in Council may prescribe the fees that are to be charged for fishery or fishing licences. It is my understanding that licence fees collected under this authority go into the federal government's Consolidated Revenue Fund, to be spent for government purposes generally. If a government department seeks to collect licence fees and use that revenue for specific purposes (e.g., fisheries-related activities), it must proceed under the *User Fees Act*, which sets onerous requirements for public consultation, review by a standing committee, and approval by the House of Commons.

Although I do not make a recommendation regarding licensing, there are, in my view, several inequities in the current licensing regime. Commercial and recreational licence fees have not been adjusted for at least 15 years. Communal

licences for economic opportunity fishing are issued without fee, although the economic opportunity fishery is a specialized component of the commercial fishery. If monies raised through licence fees could be earmarked for fisheries-related activities, that would be desirable, but several witnesses told me that the onerous requirements of the *User Fees Act* may make that goal unrealistic. In any event, DFO should consider a licensing regime in which all of these sectors of the fishery (commercial, recreational, and economic opportunity) pay their fair share.

■ DFO advisory processes: fisheries management

Introduction

DFO is responsible, together with the Fraser River Panel, for planning and managing the sockeye fishery. In carrying out this task, DFO meets with many different groups representing those who participate in, or with an interest in, the fisheries.¹¹⁸ Accordingly, a consideration of DFO's advisory processes is relevant to considering its management of the fishery. Consultation with different sectors also takes place through the Fraser River Panel; however, the focus of this section is on DFO's advisory processes.

Each year, DFO engages in a series of meetings, the scheduling of which roughly follows the fishing season. DFO meets with or is a member of the following groups: the Integrated Harvest Planning Committee (IHPC), the Commercial Salmon Advisory Board (CSAB), the Sport Fishing Advisory Board (SFAB), and the Marine Conservation Caucus.¹¹⁹

I briefly discuss DFO's Forum on Conservation and Planning, which involves consultation with First Nations, in this section. However, because it is discussed in greater detail in the Aboriginal fishing policies and programs section below, I expressly do not discuss DFO's efforts to build a co-management relationship with First Nations here.

DFO has also established an Allocation Implementation Committee to consult with the recreational and commercial sectors on issues related to allocation of their combined total

allowable catch for salmon (see below). In addition to these groups, this section provides an overview of the Integrated Salmon Dialogue Forum (ISDF), which is not a DFO process but a forum in which DFO actively participates.

Finally, I have included a discussion about the evidence I heard regarding "meeting fatigue" – the extent to which DFO's employees devote time to meetings along with those individuals who are involved in its advisory processes as representatives of various sectors.

Tier 1, Tier 2, and Tier 3 processes

When discussing the meetings in which they are involved, representatives from both DFO and the First Nations (or Aboriginal organizations) refer to Tier 1, Tier 2, and Tier 3 processes. Tier 1 refers to processes between and among Aboriginal groups.¹²⁰ Tier 2 meetings are processes between Aboriginal groups and the federal or provincial governments (for example, meetings to discuss Aboriginal Fisheries Strategy agreements).¹²¹ Tier 3 refers to processes that engage Aboriginal groups, government, and others involved in the fisheries.¹²² DFO's IHPC is an example of a Tier 3 process.

The guiding principles (or terms of reference)

The terms of reference for the IHPC, the CSAB, and the SFAB state that the bodies will adhere to the following guiding principles, all of which are worded similarly and resemble those set out in the Wild Salmon Policy as "Key Attributes of an Effective Planning Process" under Strategy 4:¹²³

Transparent: There should be transparency throughout the process based on open lines of communication and the provision of timely, accurate, accessible, clear and objective information. This information should be available to all participants in the process on an equal basis. Organizers should provide access to agendas and information needed as a starting point for informed discussion well in advance of meetings. In addition, this information will be posted to a public website to ensure accountability to all Canadians.

Accountable: Participants who are representatives of a constituency are expected to bring to the discussions the general views, knowledge and experience of those they represent, and bring back an awareness and understanding to their constituencies about deliberations of the consultation activity and reasons for decisions taken. All participants share accountability for the success of the process. The Department is accountable to participants for explaining how their advice / input was used and why and how decisions are taken.

Inclusive Representation [Balanced Representation on CSAB]: Representation on advisory bodies should relate to the mandate and function of the committee. Participation in advisory processes should be fairly balanced and reflect a broad range of interests in fisheries and oceans issues in the Pacific Region, to the extent possible, so that a diversity of perspectives is involved.¹²⁴

The terms of reference of these bodies also refer to “effective” and “efficient” guiding principles (joined together into one principle in the CSAB’s terms of reference), although they are worded slightly differently.

For the IHPC, the terms of reference state:

Effective: All participants should be satisfied that the process can achieve the goals of the mandate. This does not mean that participants will always agree with the final advice, outcome or recommendation. Processes must be cost-effective, and set and respect realistic timeframes.

Efficient: The size of the advisory committee must be kept to a number that facilitates consensus-based discussion. Wherever possible, links to other departmental consultative processes will be made to realize efficiencies in consultation.¹²⁵

For the CSAB, the terms of reference state:

Effective & Efficient: All participants should be satisfied that the process can achieve the goals of the mandate. This does not mean that

participants will always agree with the final advice, outcome or recommendation. Processes must be cost-effective, and set and respect realistic timeframes.¹²⁶

For the SFAB, the terms of reference state:

Effective: All participants should be satisfied that the process can achieve the goals of the mandate. This does not mean that participants will always agree with the final advice. Processes must set and respect realistic timeframes recognizing the volunteer nature of the SFAB.

DFO, taking into consideration its financial capacity and current policies, will provide funding consistent with the effective and efficient discharge of the SFAB and its approved sub-committees in fulfilling their mandate, roles and responsibilities.

Efficient: The size of the advisory committee will reflect a balance between the diversity of fisheries and oceans issues in the Pacific Region, and participant numbers that will facilitate productive discussion. Should committee, or subcommittee size become an issue, the above noted principle of “Inclusion” will be the overriding priority. Wherever possible, links to other departmental consultative processes will be made to realize efficiencies in consultation.¹²⁷

The salmon Integrated Harvest Planning Committee

DFO established the IHPC in 2004, partly as a response to recommendations set out in the *Independent Review of Improved Decision Making in the Pacific Salmon Fishery: Final Recommendations*, 2001, by the Institute for Dispute Resolution at the University of Victoria.¹²⁸ The IHPC “is intended to provide an opportunity for the different interests to come together and work on coordination of fishing plans and identify potential conflicts in areas where they need to work together across their fisheries to try and work things out.”¹²⁹ The IHPC is an advisory process, not a decision-making process, which was reiterated in the final written submissions of the First Nations Coalition.¹³⁰ In its final written

submissions, Canada described the IHPC as “the key advisory process used by DFO for integrated planning of the Pacific salmon fishery.”¹³¹

The salmon IHPC has two regional subcommittees, one for the South Coast and one for the North Coast. Each regional subcommittee is made up of the following: six representatives from the South Coast CSAB or four representatives from the North Coast CSAB (from the southern or northern regional committee), three representatives from the SFAB (again, from the northern or southern regional committee), two representatives from the Marine Conservation Caucus (from the regional caucus), four First Nations representatives, and an ex officio representative from the province.¹³² The IHPC is chaired by an independent facilitator hired by DFO.¹³³

The terms of reference of the IHPC dated May 2005 expressly state that its purpose is “to promote a more streamlined, representative, cross-sectoral advisory process related to salmon harvest planning, management and post season review.”¹³⁴ Its mandate is as follows:

The IHPC is the primary contact for the Department for cross-sectoral communication and advice and [for] mak[ing] recommendations to the Department on operational decisions related to salmon harvesting in the Pacific Region. The goal of the IHPC will be to ensure fishing plans are coordinated and integrated, identify potential conflicts, and if there are disputes, make recommendations for solutions if possible.¹³⁵

The IHPC’s roles and responsibilities are set out in the terms of reference:

Pre-season:

- Provide recommendations that ensure fishing plans are coordinated and integrated, identify potential conflicts, and recommend a means of resolving disputes;
- Receive from and provide advice to DFO on pre-season forecasts and stock assessments;
- Review enforcement plans, identify problems and provide recommendations on the management or enforcement of the fishery, and make recommendations for improvement;

- Provide input on stock assessment programs, as required for management purposes;
- Provide advice on changes to escapement strategies or policies;
- Advise on IFMPs (i.e. decision guidelines, fishing plans);
- Advise on measures and mechanisms for timely and accurate catch / effort information; and
- Advise on selective fishing practices.

Post-season:

- Review post-season stock status to determine if conservation goals were met;
- Advise on problems encountered regarding management, enforcement and consultation;
- Advise on management, enforcement or other actions that will improve the fishery;
- Review anomalies not covered in the fishing plan;
- Review expected stock status for the coming year; and
- Review the stock assessment program.¹³⁶

The IHPC typically meets six times each year; of these meetings, three will be the IHPC as a full committee in November, March, and May; the other meetings will be of the southern and northern committees meeting separately (December-January) for post-season review.¹³⁷

The May 2005 terms of reference stated that the IHPC would be reviewed and evaluated by DFO and IHPC participants no later than 2006. In March 2007, Pam Cooley, a consultant hired by DFO, produced an evaluation of the IHPC, based on interviews or surveys of four DFO employees and representatives from the various sectors.¹³⁸ In her summary of the IHPC evaluation, Ms. Cooley wrote:

Concerns remain about representation: how people are chosen to be on the IHPC from their sectors and interest; consistency in the representation from meeting to meeting; and the decision-making authority of the representative. Representation processes require continued refinement and more consistency for the IHPC but not to gain legitimacy as

the mechanism for sectors to solve harvest-planning conflicts. All sectors struggle with the refinement of true representation but that does not stop a constructive process.

All have a great amount of respect for the First Nations' own challenges regarding true representation at a table like the IHPC. More legitimate representation from all sectors and interests could lead to a more viable problem solution process; however, waiting for this would be unrealistic.

Data issues are also a main concern: the timeliness of data for analysis, quality of the data and producing it so that people can use it and make decisions. There is also a question of openness to new methods of obtaining data from other sources and science. The main disputed issue heard through the evaluation is with DFO and how decisions are being made, particularly "in-season."

... While there are numerous processes and structures relating to salmon, most agree that the IHPC is different and can be enhanced in the future with a more consistent and relevant approach to harvest planning. The DFO would not have to defend its positions if there was more stakeholder participation in the IFMP and decision-making processes. There would be more collaborative analysis and ownership if the IHPC were truly being consulted.¹³⁹

Echoing Ms. Cooley's reference to DFO's decision-making processes, Jefferey Young, a representative of the Marine Conservation Caucus (briefly described below), expressed concern that DFO has not reached a point through the IHPC process where its decision making (and that of the minister with respect to the IFMP) is transparent.¹⁴⁰

Ms. Cooley's 2007 evaluation referred to the guiding principles set out in the IHPC's terms of reference and made the following suggestion about improving inclusive representation at the IHPC: "Continue to invite and find ways for as much [First Nations] participation as possible in IHPC and sub groups. It may mean, at times[,] that the DFO approach [First Nations] after an IHPC decision."¹⁴¹ During the hearings, witnesses testified that First Nations representation on the IHPC is inadequate:

I think that First Nations are not adequately represented at the IHPC ... There is no representation from the middle Fraser, the other tribes in the area, or the lower Fraser ... [or from] the south coast marine First Nations.¹⁴²

I think First Nations are under-represented ... generally, given the scope of impact of ... DFO's decisions that may or may not be ... discussed at the IHPC, First Nations are significantly affected by those and representation of First Nations is, I think, less than ideal.¹⁴³

Through the IHPC, DFO attempts to bring all parties to the table.¹⁴⁴ However, Susan Farlinger, regional director general, Pacific Region, acknowledged that there is still work to do on increasing the participation of First Nations Coalition (FNC) in the IHPC (integrated process).¹⁴⁵ In its final written submissions, the First Nations Coalition noted the lack of adequate participation by First Nations in the IHPC and described the reasons behind it:

The IHPC suffers from the lack of a coordinated process to ensure First Nations representation. Although Mr. Matthew attends for the Secwepemc Fisheries Commission, Mr. Shepert attends from the Upper Fraser, Don Hall attends for the Nuu-chah-nulth, and Murray Ned has recently begun attending the South Coast IHPC meetings as an observer from the Lower Fraser, such attendees do so in a technical capacity and do not carry mandates to negotiate the content of the IFMP with other sectors. Most of the witnesses who testified in regards to the IHPC noted that First Nations were under-represented at the IHPC, and they were sympathetic to First Nations' calls for a coordinated, Tier 1 approach to assist the IHPC table. The difficulty in not having mandated First Nations represented at Tier 3 processes, such as the IHPC, is that First Nations attendees are then not in a position to meaningfully contribute to the discussions or help make difficult decisions.

A primary reason First Nations are not currently attending the IHPC is that they will not negotiate the protection and exercise their s. 35 Aboriginal rights, particularly their priority s. 35 FSC rights, with stakeholders ...

Although DFO insists that the IHPC is not the location to discuss Aboriginal rights, the fisheries management decisions in the IFMP have potential impacts on the exercise of Aboriginal and treaty rights, and therefore require consultation and, where appropriate, accommodation. The FNC submits that given the nature of the decisions made in the IFMP [IHPC], and the fact that the IFMP guides the decision making process that occurs in-season at the FRP [Fraser River Panel], it is critical that First Nations have an opportunity, on a Tier 2 level, to discuss these issues with DFO ...

DFO has recognized the difficulty for First Nations to come to these processes when they are still trying to have their rights affirmed. Mr. Rosenberger testified that DFO would like to see a process developed, through the Roadmap Initiative, that would allow First Nations representatives to feed into representative processes like the IHPC, or the FRP, or other management processes. The FNC submits that the challenges of securing meaningful First Nations representation at the IHPC underscores the importance of developing and properly resourcing Tier 1 and Tier 2 processes[.]¹⁴⁶

Brian Assu, councillor of the We Wai Kai Nation and member of the Fraser River Panel, Mr. Young, and Peter Sakich, commercial fisher and member of the Commercial Salmon Advisory Board, agreed that the role of the IHPC is an advisory one.¹⁴⁷ The IHPC does not make decisions for DFO but provides a forum (to some degree) for the resolution of conflict among the sectors. Wayne Saito, a consultant to the province and former DFO employee, said:

[The IHPC] is intended or designed to provide advice to [DFO] regarding the efficacy of fishing plans in the pre-season and to comment on the achievement of objectives in [the] post-season sense ... one of the primary focuses is to identify areas of competing and conflicting interest and to engage in discussions ... to the extent possible, to resolve them.¹⁴⁸

Dr. Gerry Kristianson, chair of the Sport Fishing Advisory Board, told me: "The IHPC is the place where we can meet with the other harvest sectors

and the conservation group to work through the places where those [fishing] plans intercede [*sic*] or conflict. So it's to get at that aspect of things that is particularly valuable and important to us."¹⁴⁹

The IHPC, however, operates on consensus – something that is difficult to achieve, given the diversity of interests among the various representatives. In the two instances where consensus on an issue has been reached at the IHPC, DFO has not implemented the recommendation.¹⁵⁰ Chris Ashton, a commercial fisher, described his frustration with this situation:

I just wanted to bring up one point that the IHPC, working on consensus, I asked some colleagues how many instances you could ever remember that we actually had a motion put forward and reached consensus and, collectively, we only came up with two ...

... [T]here was a motion put forward and the entire IHPC passed that motion by consensus that they agreed that [the CSAB] should have funding.

The other one was for the [commercial] licence holiday ...

... There [were] letters sent to the Minister and there was a motion passed by the IHPC and presumably a letter went from the IHPC to the Minister explaining the hardship that [the] requirement to pay the licence fee [when the fishery was entirely closed] was causing quite a few people.

... [We] find [it] a little disconcerting that we're asking for a licence holiday and we find out DFO, who we're asking for the holiday, probably has no intention of trying to back our request because they're trying to meet a target set by Treasury Board.¹⁵¹

Criticism was also expressed that the participants at the IHPC (as well as other consultative processes) do not have the technical expertise required to understand such things as the Fraser River Sockeye Spawning Initiative – DFO's escapement target model – and DFO's forecasting modelling because they do not have adequate funding.¹⁵²

What we're seeing in this age ... since the advent of computers, is an absolute exponential

growth in computer modelling and abstract activity that becomes at times absolutely overwhelming. And it's certainly ... a challenge for people who do not get paid and don't have the resources to go through that.¹⁵³

However, Dr. Kristianson (who is also a commissioner on the Pacific Salmon Commission) commented that it was preferable that DFO retain the technical expertise to avoid the creation of "duelling technical bodies."¹⁵⁴ He also felt strongly that DFO should be adequately funded to continue to provide the necessary technical expertise:

[M]y vision of the technical support is that a well-funded Department with highly qualified staff does the primary technical work. It subjects its technical findings and science to a peer review process called in the past PSARC [Pacific Scientific Advice Review Committee] and now CSAP ... And the other interests can have technical people or others at those PSARC meetings ... that gives us the ability to understand and question what the Department's doing, and out of that comes the advice which flows from Science to Management in the Department of Fisheries and Oceans. I think it's a good model. I think it's not adequately supported at present for reasons that are not the fault of Pacific Region, but I would not like to see, at least in our case, resources diverted from that to try and provide what would become inevitably duelling scientific hired guns.¹⁵⁵

Several witnesses, including Paul Ryall, former lead of DFO's Salmon Team and former chair of the Fraser River Panel, testified that the IHPC did not function as a "policy forum" or a place in which DFO policy could be debated. He agreed that neither role belonged to the IHPC.¹⁵⁶

The Commercial Salmon Advisory Board

The terms of reference of the CSAB¹⁵⁷ were finalized in February 2006.¹⁵⁸ The CSAB is independent from DFO, although DFO staff participate in its meetings, and express roles and responsibilities for DFO are set out in the CSAB terms of reference. The mandate of the CSAB is to serve as the

consultative body on issues that affect commercial salmon fisheries. It includes providing advice on policy matters related to the commercial fishery; developing commercial salmon harvest plans that consolidate and coordinate the interests of the various areas and gear types; and providing recommendations to resolve conflicting issues within the commercial sector allocation, harvesting priorities, and responses to *Species at Risk Act* concerns.¹⁵⁹

The CSAB is made up of one main board and two geographic subcommittees, north and south. The CSAB's terms of reference provide for salmon area harvest committees, which represent each of the eight commercial gear types and whose members are elected by every licence holder in the commercial fleet.¹⁶⁰ The committees each elect two representatives who are responsible for representing the interests of the specific area and gear type to the CSAB.¹⁶¹ The membership of the CSAB also includes two representatives of each of the United Fishermen and Allied Workers' Union (UFAWU) and the processing industry; in addition, a representative of the province sits on the board ex officio.¹⁶² The Native Brotherhood of British Columbia was initially represented on the CSAB, but it withdrew in 2006.¹⁶³ Kathy Scarfo, a commercial fisher who is the president of the West Coast Trollers' Area G Association, was critical of the membership of the CSAB and told me that, in her opinion, the inclusion of the processing industry was not appropriate for an organization representing fishers.¹⁶⁴

The CSAB's terms of reference set out the roles and responsibilities for DFO, the Area Harvest Committees, the CSAB secretariat, and the CSAB itself. They include:

- DFO will provide fisheries management and technical expertise, as agreed to by both parties, to support CSAB meetings.
- The CSAB secretariat is responsible for development of the meeting agenda and notification of CSAB members. The DFO will be invited to add to the agenda.¹⁶⁵

The CSAB's express roles and responsibilities include, among others, that it

- Nominate representatives from the membership of the CSAB to sit on the DFO Integrated Harvest Planning Committee.

...

- Develop decision guidelines for in-season management action in the commercial sector.
- Develop a coordinated management plan.

...

- Provide advice on principles and guidelines for the commercial harvesting component for any new or emerging stock assessment programs.

...

- Provide in-season advice and recommendations on fishing related issues to the Department as appropriate.
- Provide advice on other commercial sector issues as required.

...

- Meet with Sport Fish[ing] Advisory Board (SFAB) and First Nations representatives or other interested parties as appropriate to resolve issues between the sectors.
- Develop or acquire scientific expertise necessary to adequately represent the commercial sector in dealing with issues like endangered species, reduced harvest rates on particular stock, departmental spawning ground initiatives, etc[.]

...

- Support the development of a funding mechanism[.]¹⁶⁶

The CSAB's terms of reference for the area harvest committees (AHCs) set out further roles and responsibilities for both the DFO and the committees, including the following:

DFO:

- Fishery managers will meet with AHC's [sic] as needed to review information discuss fishing options and implement fisheries.
- Develop collaborative arrangements with the AHC's [sic] ...

AHC:

- Develops specific harvesting plans including fishery time frame, starting dates, and boundaries for individual

fisheries relative to the area and gear type for consolidation and coordination by the CSAB.

...

- Identify problems encountered regarding the management or enforcement of the fishery.
- Meet with the SFAB, First Nations representatives, or other interested parties as appropriate to resolve issues affecting the respective sectors or area gear types.
- Provide in-season advice on fishing related matters to DFO as appropriate to the area and gear type.¹⁶⁷

The CSAB's decisions or advice are to be developed through consensus, whereas the decisions of the area harvest committees are made by simple majority.¹⁶⁸ When consensus cannot be reached, the CSAB chair summarizes the differing views and "advise[s] the Department accordingly."¹⁶⁹ Mr. Grout testified that, from DFO's perspective, the CSAB is "effective for getting feedback on issues," but DFO recognizes that it is challenging for the CSAB, because of its makeup, to reach consensus "on some of the more controversial issues."¹⁷⁰ Participation in the CSAB is also governed by a "Committee Charter" that defines the expectations members may have for how they work together: CSAB members have a responsibility to participate in consultations in good faith and to engage in "effective, balanced and civil communication[s]."¹⁷¹

DFO managers and its salmon officer participate in the meetings of the CSAB, including having set the CSAB's terms of reference.¹⁷² Although the CSAB's consultation meetings with DFO "vary from year to year," they typically hold a post-season review meeting in January to review the southern BC fisheries (which include Fraser River sockeye), and another meeting in April to review the commercial salmon harvest sharing arrangements and negotiate the allocations of fish for the different gear types under the proposed fishery plan for the coming season.¹⁷³

DFO does not fund the CSAB, and some commercial fishing witnesses felt strongly that the lack of funding negatively affects participation in the CSAB.¹⁷⁴ Ryan McEachern, a commercial gillnet fisher and a representative on area harvest committees and the CSAB, recommended:

[I]f there's one recommendation around the advisory process that I would hope would come out of this Commission [it] would be that the participants from the various commercial fleets should be adequately compensated for their time and their expenses ... putting that load on the commercial fishermen at the same time that the economic viability of the fleet is on the decline has been very hard to bear.

...

[B]ecause the advisory processes are not funded, you have a large group of people that attend all of the meetings and [at] every meeting [there] are people that are getting paid in some fashion, particularly when it comes to company representatives.

...

You could either change the make-up of the Commercial Salmon Advisory Board so you limit it to fishermen only, and the union and the companies would need to make their advice to the Department in a separate forum, or you could pay the independent fishermen themselves for attending these meetings so that they would be able to participate at the same level that the union or the company would.¹⁷⁵

In relation to DFO's consultation with the commercial sector, Ms. Scarfo observed:

I don't think the CSAB is going to make any difference to Fraser River sockeye survival; there are major problems with the consultation processes that DFO engages with ... I think that somebody told me the other day that[,] on the west coast alone[,] fisheries managers attend 160 different management consultation processes. Most of them I would say are meaningless. Most of them are presentations of PowerPoint that I could just as easily sit at home, without incurring costs, to look at. You very rarely get time to ask any meaningful questions, because usually the room is too big or the person who actually made the presentation isn't there to answer the questions. So it's kind of meaningless consultation; it's window dressing.¹⁷⁶

Mr. Grout offered the following explanation about the competing interests in DFO's

participation in the consultative processes, in the context of those with the commercial sector:

I think there's a fine balance there because if you aren't engaged in these processes and you don't have discussions in an open and transparent way, you risk losing some of the accountability that the processes were intended to bring into play. So they were trying to keep these processes effective and efficient and we continue to discuss with these committees ways that we can improve what we're doing but I think there's a balance there.

If you go too far one way and there's no consultation at all, I think that takes you back a number of years to times when people were complaining about the lack of transparency in the decision making, lack of input on some of the decisions that were made. The department's moving much more in the direction of harvesters and others having an increased role in how we manage the resource.¹⁷⁷

The Sport Fishing Advisory Board

The SFAB is a volunteer body whose members represent both recreational anglers from across the province and people whose economic interests are related to sport fishing.¹⁷⁸ DFO can have a role in determining the representation on the SFAB; Mr. Grout stated that DFO is "looking to see that the representation is balanced ... the department has been involved in setting up the terms of reference" for the SFAB.¹⁷⁹ Since 1964, the SFAB has been the primary process for DFO's consultation involving the recreational fishing sector.¹⁸⁰ Its mandate is to provide formal advice and make recommendations to DFO on matters relating to tidal recreational fisheries and non-tidal anadromous fisheries.¹⁸¹

Like the CSAB, the SFAB has a main board (Main SFAB) and two geographic subcommittees, the North Coast and South Coast regional committees. The SFAB is made up of local sport fishing advisory committees, covering much of the province, which are represented in the two regional committees (which, in turn, are represented in the Main SFAB). In addition to this hierarchical and regional organization (from local to regional to the main board),

the SFAB has specific working groups for particular species or issues, including a “sockeye, pink and chum working group.” The main board includes the chairs and elected representatives from the North Coast and South Coast regional committees, as well as appointed organization representatives (including the B.C. Wildlife Federation, the B.C. Federation of Drift Fishers, the Sport Fishing Institute, and the Pacific Salmon Commission), and ex officio government representatives.

The SFAB’s terms of reference contain a membership policy that requires “the majority of the SFAB to be Primary Level User Group Members,” meaning “persons who do not receive a significant amount of their annual income directly or indirectly from the recreational fishery.”¹⁸² The SFAB provides advice to the federal and provincial governments and assists in disseminating information to the angling community and the general public. It also recommends recreational fishing representatives to sit on or participate in, among others, the Pacific Salmon Commission and the IHPC.¹⁸³

DFO meets with the Main SFAB in January for post-season review and pre-season planning. DFO also meets with the SFAB’s South Coast regional committee in late March or early April to go over the draft of the Integrated Fisheries Management Plan (IFMP) and meets again with the Main SFAB in late April to review the IFMP.¹⁸⁴ DFO provides funding for travel and accommodation expenses for SFAB representatives participating in meetings with DFO.¹⁸⁵

The Marine Conservation Caucus

The Marine Conservation Caucus is an umbrella group that was formed in 2003 and that represents nine or 10 environmental non-governmental organizations, including the David Suzuki Foundation, Watershed Watch Salmon Society, Raincoast Conservation Foundation, and the Canadian Parks and Wilderness Society.¹⁸⁶ It participates in DFO’s IHPC and acts as an observer at the Fraser River Panel’s Canadian Caucus.¹⁸⁷ According to Mr. Young, one of the representatives of the Marine Conservation Caucus at both the IHPC and the Canadian Caucus, the Marine Conservation Caucus hopes to ensure “that conservation is held up as the priority mandate for DFO.”¹⁸⁸ He acknowledged that the caucus does not represent all environmental interests, but that its

participation in the IHPC provides a useful means for environmental groups to provide input to DFO on Fraser River sockeye issues.¹⁸⁹

Forum on Conservation and Harvest Planning for Fraser Salmon

In 2008, as a result of forecasted poor returns, DFO hosted a series of workshops with Aboriginal groups on harvest planning, with the goal of discussing how small returns of Fraser River salmon could be shared among them.¹⁹⁰ DFO recognized that poor returns for Fraser River salmon would limit harvest opportunities and could potentially have an impact on the ability of Aboriginal groups to harvest salmon for FSC purposes.¹⁹¹ The meetings have continued for the past four years and are now called the Forum on Conservation and Harvest Planning for Fraser Salmon, coordinated by the Fraser River and Approach Working Group (which consists of representatives of both First Nations and DFO and which operates with administrative assistance of the Fraser River Aboriginal Fisheries Secretariat).¹⁹² The forum meets about four times a year¹⁹³ to review technical information and discuss management issues and approaches to Fraser River salmon.¹⁹⁴ DFO does not view the forum as a decision-making body,¹⁹⁵ but these meetings have led to an agreement among First Nations on how to deal with low Early Stuart returns.¹⁹⁶

Although the forum provided a venue for discussions regarding FSC fisheries, Aboriginal participants indicated a desire to develop a more permanent co-management structure or process between Aboriginal groups and DFO regarding Fraser River salmon.¹⁹⁷ In response, a new process called the Fraser River Salmon Roadmap was developed in 2009 to bring together DFO and Aboriginal groups from the Fraser River watershed, Vancouver Island, and the marine approach areas.¹⁹⁸ The roadmap process is discussed in more detail in the Aboriginal fishing policies and programs section later in this chapter.

In its final written submissions, Canada indicated that DFO intends for the roadmap process to have linkages with other advisory processes, such as the IHPC.¹⁹⁹

Recreational-Commercial Salmon Allocation Implementation Committee

DFO held the inaugural meeting of the Allocation Implementation Committee on November 10, 2004. Its purpose is to deal with allocation issues that make an impact on both recreational and commercial fishers (the Aboriginal sector is not represented on this committee, although individuals who are Aboriginal may be involved as commercial fishers).²⁰⁰ The committee was active for three years (until 2007) and was reactivated in late 2009 or early 2010 to address further allocation issues, including those stemming from the 5 percent cap DFO's Salmon Allocation Policy put on the recreational portion of the combined recreational-commercial total allowable catch for sockeye.²⁰¹

The terms of reference of the Allocation Implementation Committee set out in its mandate:

[To] be a forum to discuss issues related to the implementation of the *Allocation Policy for Pacific Salmon*.

To provide advice to the Minister regarding specific allocation issues that have a direct impact on both the recreational and commercial sectors.²⁰²

Like the IHPC, the CSAB, and the SFAB, the Allocation Implementation Committee is guided by principles of transparency, accountability, inclusive representation, effectiveness, and efficiency.²⁰³ Its membership is 11 representatives from the CSAB, 11 representatives from the SFAB, and four representatives from DFO.²⁰⁴ The Province of British Columbia may participate in an ex officio capacity. The committee is responsible for identifying issues “not clarified in the Allocation Policy,” developing consensus recommendations for consideration by fishery managers, and providing advice to DFO on specific issues related to inter-sectoral allocation.²⁰⁵

Integrated Salmon Dialogue Forum

The ISDF was created in 2006 as a result of the recommendation stemming from the 2001

report, *Independent Review of Improved Decision Making in the Pacific Salmon Fishery*,²⁰⁶ and was to run from 2007 through the spring of 2011. The ISDF described itself as a “BC-wide process that brought diverse participants together to work as partners in a conversation to share information, incubate new ideas and approaches, and start to address some of the big issues impeding progress toward a fully integrated and sustainable salmon fishery.”²⁰⁷

The participants in the ISDF were volunteers.²⁰⁸ They were drawn from First Nations, DFO, the province, commercial and recreational fishers, and conservationists,²⁰⁹ but they were not mandated to speak on behalf of these groups. As a result, any consensus reached at the ISDF was non-binding.²¹⁰ I heard evidence from participants that the ISDF did not fulfill the role of a policy advisory body, nor was it an appropriate policy forum.²¹¹

The ISDF did not have terms of reference per se, but a consensus framework developed by its participants set out the following description of its goals:

What is the Forum?

- a. The Integrated Salmon [Dialogue] Forum provides a collaborative and inclusive opportunity for all interests to work towards a fully integrated sustainable fishery in ways that respects *[sic]* the Wild Salmon Policy and serves both people and salmon.
- b. Participants have agreed to make best efforts to work through their respective processes, agencies and organizations to give effect to any consensus reached in the forum, and to address any differences that emerge.

What are the goals of the Forum?

- a. Developing shared principles that can have broad application across an integrated and sustainable salmon fishery, and relevant processes.
- b. Enabling broadly based interest connected with the salmon fishery to identify and address underlying issues.
- c. Developing innovative possibilities to assist the diverse interests associated with the fishery to reach common ground and generate enduring solutions.

- d. Building collaborative relationships, networks and partnerships through which different sectors will have an opportunity to express and advance concerns and interests, and explore how they might best create mutual value.
- e. Stimulate and inform discussions within existing processes in ways that support and enhance the management of an integrated fishery.
- f. Carry out the work of the Forum at two levels: a “high beam” – e.g. regional, policy, long term[,] and a “low beam” [–] specific, ground level, operational.²¹²

The ISDF was characterized as “a safe place to talk”²¹³ or “a forum of dialogue where folks can get together ... and discuss very prickly issues in and around the Fraser River.”²¹⁴ Through the ISDF’s Monitoring and Compliance Working Group, the Monitoring and Compliance Panel was formed. Its report, *Charting Our Course*, is discussed in the section of this chapter on fisheries monitoring and catch reporting.

In its final written submissions, the Province of British Columbia encouraged DFO’s ongoing and future support of the ISDF and its Monitoring and Compliance Panel, asserting that these initiatives provide the opportunity to involve all those who have an interest in the fishery and who can improve relationships and build trust.²¹⁵ The First Nations Coalition, however, urged more involvement in Tier 1 and Tier 2 processes rather than the Tier 3 process of the ISDF.²¹⁶

The extent of DFO’S meetings

During the hearings, I heard from many different witnesses about the amount of time required to attend meetings by both DFO staff and representatives of the different sectors. Mr. Saito, a former DFO employee who now works primarily with the province and was actively involved in the ISDF, was particularly concerned about the level of “meeting fatigue” experienced by participants:

My only observation and concern is that many of the individuals that participate in the myriad of consultation fora and meetings

are the same people, and there is this issue of fatigue, perhaps, in that ... an awful lot [is being] asked of individuals to participate day after day, week after week in very similar forums, and I think it’s asking an awful lot of individuals. And I know that [for] some people ... the demands have been more than they could provide, and ... you’re starting to see some drop out in some of these processes. I’m very fortunate, quite frankly, in observing the high level of integrity and competency within the individuals that do participate, but one only has to take a look at a three-page list of the number of meetings that are going to take place over a year, relating to just salmon, and realize that the same people are at those same meetings, that you’ve got to ask yourself how long can this take place.²¹⁷

Dr. Kristianson supported Mr. Saito’s concerns, although he spoke positively about DFO’s efforts at consultation through meetings:

[T]he Department of Fisheries and Oceans deserves a gold star for being probably the most consultative department of government in this entire country. I’m not aware of any department of government, federal or provincial, that spends as much time trying to understand the needs of its constituents.

...

Now, can things be improved? Of course. I mean, I think we’re all troubled by the issue Wayne has raised, the demands on individuals.

...

The other side of this is – to keep in mind that we’re just talking about salmon here, and in particular, Fraser River salmon. There are a whole series of other processes, advisory consultant processes going on in DFO related to other species. So one can’t look at one part of the puzzle without thinking of the other.²¹⁸

Mr. Rosenberger, area director of BC Interior (based in Kamloops), testified that, during the fishing season, he meets once or twice a week with local First Nations fisheries harvest committees regarding FSC openings, meets weekly with recreational fishing groups regarding recreational

fishery openings, and has weekly conference calls with commercial fishers where the Area Harvest Committee representatives can discuss commercial openings.²¹⁹ Marcel Shepert of the Upper Fraser Fisheries Conservation Alliance told me that he attends between 20 and 30 meetings a year between DFO and Aboriginal organizations,²²⁰ and Ernie Crey, fisheries advisor with the Stó:lō Tribal Council, said that he attends between 30 and 40 meetings a year with DFO.²²¹ Mr. Grout testified that he meets with every First Nations planning committee for each economic opportunity fishery.²²²

Witnesses told me that it was inefficient to have the same information repeated at different meetings where several of the same participants are present. Pat Matthew, fisheries management coordinator for the Secwepemc Fisheries Commission, told me that there are “too many processes out there” and that repetitive technical pre-season and post-season information is presented by DFO.²²³ It is also expensive to host and participate in meetings. Mr. Rosenberger told me that a “significant portion” of DFO time and resources is spent on engaging with First Nations at different levels,²²⁴ and Ross Wilson of the Heiltsuk First Nation stated that he did not have enough funds to attend most of the meetings that take place.²²⁵ Grand Chief Saul Terry of the St’at’imc Nation said that money spent at “enormous huge meetings” with sometimes questionable results could be better used on stream cleaning or local projects overseen by First Nations.²²⁶

Mr. Young told me that he thought the efficiency of these processes could be improved and that this point alone could alleviate meeting fatigue. He said it is difficult for the Marine Conservation Caucus to participate fully in all the processes.²²⁷ Mr. Crey said that, although he was happy to attend meetings and talk with DFO, “there has to be a purpose for all the talk and the commitment of resources.”²²⁸ Mr. Shepert stated that, after attending meetings with DFO for the past 15 years, “the dialogue has definitely run its course,” and it was now time for action.²²⁹

Findings

Although I do not make a recommendation, I am satisfied that the Integrated Harvest Planning

Committee (IHPC) process serves a useful purpose. However, I heard concerns about

- the need for increased First Nations’ representation in the IHPC process; and
- the need for the Department of Fisheries and Oceans (DFO) to explain when its final Integrated Fisheries Management Plan differs from the recommendations made by First Nations and stakeholders during the IHPC processes.

I encourage DFO to address both these issues.

In addition to the above, I heard evidence that satisfies me of the value of DFO’s advisory processes with the Commercial Salmon Advisory Board and the Sport Fishing Advisory Board, and I encourage DFO to continue to support these activities. I understand that DFO provides funding for travel and accommodation for sport fishing representatives attending meetings with DFO but does not provide comparable funding for independent commercial fishers. I encourage DFO to apply a consistent policy in relation to both advisory groups.

It is clear to me that all these advisory meetings create “meeting fatigue” for those involved, including DFO employees. While some of these meetings are a necessary and important component of DFO’s management of the fishery, I encourage DFO to find ways to reduce the number of meetings and to streamline its advisory processes in order to alleviate meeting fatigue and conserve DFO resources.

I discuss these findings and any related recommendations in Volume 3 of this Report.

Allocation

In the management of the fishery, “allocation” describes the number of fish that a sector (commercial, recreational, or Aboriginal fisheries), gear type, or licence holder is allowed to catch.²³⁰ According to Ms. Farlinger, “[A] key pillar of any successful management regime is deciding and writing down who gets what.”²³¹ Allocation of salmon is usually expressed as percentages of the total allowable catch (TAC), while in the FSC fishery it is either an absolute number or a percentage of TAC (see the explanation of total allowable catch in the section below).²³²

The process of allocating TAC among sectors is called “inter-sectoral allocation”; allocation among gear types within the commercial sector is called “intra-sectoral allocation.”²³³ DFO uses its 1999 Allocation Policy for Pacific Salmon (Salmon Allocation Policy)²³⁴ to determine both inter-sectoral and intra-sectoral allocation.

Mr. Grout stated that “allocation refers to how the resource is shared between conservation objectives [and harvested] by various participants.”²³⁵ Allocation affords DFO a tool to manage the fisheries and offer fairness in the fisheries to the various fleets and sectors; however, as I describe below, allocation is a contentious issue.

I received public submissions regarding DFO’s allocation policies and practices in the salmon fishery, including the following suggestion:

In its investigation of DFO’s management of the commercial fishery, the commission should consider several specific questions pertaining to the Sockeye Allocation Policy, the use of sockeye equivalents, and stakeholder consultation processes. The commission should recommend that commercial fishermen be paid not to fish in years of low abundance, which would provide relief while maintaining the infrastructure to harvest strong returns.²³⁶

DFO authority over allocation

DFO’s authority over allocation arises from its ability to set and vary limits or quotas on the amount of fish caught under the *Fisheries Act* and its regulations (described in Chapter 3, Legal framework). Section 43(1)(c) of the Act allows the Governor in Council to make regulations respecting the “catching, loading, landing, handling, transporting, possession and disposal of fish.” The *Fishery (General) Regulations* allow the minister to specify conditions on a fishing licence respecting “the species of fish and quantities thereof that are permitted to be taken or transported.”²³⁷ This regulation also provides that,

where a close time, fishing quota or limit on the size or weight of fish is fixed in respect of an area under any of the Regulations listed in

subsection 3(4) [which includes both the *British Columbia Sport Fishing Regulations*, 1996, and the *Pacific Fishery Regulations*, 1993], the Regional Director-General [or a fishery officer] may, by order, vary that close time, fishing quota or limit in respect of that area or any portion of that area.²³⁸

In the Pacific Region, the Salmon Team is responsible for implementing the Salmon Allocation Policy. The Salmon Working Group also coordinates the implementation of regional and national strategies relating to allocation.²³⁹

Pre-1999 allocation process and reviews

Before the mid-1980s, DFO had no formal procedures for allocating salmon, either inter- or intra-sectorally; in general, DFO managed openings to provide fishing opportunities to the seine and gillnet fleets for sockeye, pink, and chum salmon, while the troll fishery focused on chinook and coho salmon.²⁴⁰ In the late 1980s and early 1990s, DFO worked with the Commercial Fishing Industry Council, an independent body contracted by DFO, to provide a yearly catch allocation formula to determine intra-sectoral allocation.²⁴¹

In December 1995, the Pacific Policy Roundtable issued a *Report to the Minister of Fisheries and Oceans on the Renewal of the Commercial Pacific Salmon Fishery*, in which it recommended the appointment of an advisor to the minister on inter-sectoral allocation to set rules associated with initial catch shares and adjustments over time. As a result, Minister Fred Mifflin contracted Dr. Art May to conduct an assessment of inter-sectoral allocation of salmon in British Columbia.

The May Report, 1996

After consulting with the fishing sectors, Dr. May concluded²⁴² that there was “no possibility of building consensus among all interested parties on principles or policy frameworks to guide the conservation and utilization of Canada’s Pacific salmon fisheries.”²⁴³ He set out a number of policy considerations for the minister to consider in

the development of an allocation framework: that allocations for Aboriginal fish should have priority; that initial shares for the commercial and recreational sector need to be based on the most recent historical period (he suggested 1991–94); and that the recreational fishery have priority for chinook and coho fisheries. The May Report did not address intra-sectoral allocation, nor did it reflect a consensus on inter-sectoral allocation. DFO continued exploring these issues in subsequent work by Samuel Toy and Stephen Kelleher.

The Toy Report, 1998: inter-sectoral allocation

In October 1997, the minister appointed Samuel Toy,²⁴⁴ a retired justice of the BC Court of Appeal, to carry out and oversee consultations on inter-sectoral salmon allocations, focus his review on issues identified in Dr. May's report, and work with stakeholders to come to a consensus on as many issues as possible.²⁴⁵ Mr. Toy took advice on how to consult with the various sectors from a group of 10 advisors representing the Aboriginal, commercial, and recreational sectors; however, the Aboriginal sector withdrew from the process, citing pending settlement of land claims and the need for fair compensation for historic infringements on Aboriginal fishing rights.²⁴⁶ Mr. Toy proceeded to consult with the commercial and recreational sectors, and eventually secured the agreement of these sectors on a statement of 10 principles concerning allocation.

Mr. Toy made two official recommendations to the minister. The first was to adopt, with some qualification, the statement of principles developed by the representatives from the commercial and recreational sectors. The second was to create a new initiative in which regionally elected management boards would advise on allocation issues under the wing of an independent allocation tribunal.

The Kelleher Report, 1998: intra-sectoral commercial allocation

Contemporaneously with the Toy process, the minister contracted with lawyer and arbitrator Stephen Kelleher to consult with commercial fishers and make recommendations on intra-sectoral allocation. Mr. Kelleher undertook two sets of

consultations with commercial fishers: one in 1997 and the other in 1998. His April 1998 report summarizes the results of both these consultations.²⁴⁷ Based on his 1997 consultations, Mr. Kelleher made seven recommendations to the minister:

1. Allocation should include all five species, sockeye, chum, pink, coho and chinook salmon.
2. Sockeye equivalents should be the unit of measurement in allocation.
3. Where possible, an allocation plan should reflect traditional fishing patterns.
4. Allocation must be considered on a four year basis.
5. The allocation plan should target coast-wide shares of 34 per cent gillnet, 42 per cent seine, and 24 per cent troll.
6. Allocation planning should strive for equality between southern areas, but cannot guarantee equality between northern and southern areas.
7. The allocation plan should provide for Fraser River Sockeye catch-up / make-up amounts of 477,477 Sockeye to be given the troll fleet, and 143,754 to be given the seine fleet. This payback arises from terms of the 1990–94 Long Term Allocation Plan.²⁴⁸

After the 1998 consultations, Mr. Kelleher made an additional 23 recommendations about how allocation within the commercial sector should proceed among gear types. The recommendations covered, among other things, deficit surplus accounting (monitored by DFO year to year by sockeye equivalent) with a formal allocation accounting once every four years, bycatch (unintentional catch) in the northern fisheries, allocation changes over time, specific troll-fleet issues, and selective fishing practices.²⁴⁹

DFO's Salmon Allocation Policy

In December 1998, in response to the work performed by Dr. May, Mr. Toy, and Mr. Kelleher, DFO released a report entitled *An Allocation Framework for Pacific Salmon 1999–2005*. DFO held three workshops in March and April 1999 to gather feedback on the Allocation Framework, and it also

received 225 pages of written submissions.²⁵⁰ Based on these consultations, DFO revised its Allocation Framework in October 1999 and renamed it An Allocation Policy for Pacific Salmon (Salmon Allocation Policy).²⁵¹ According to DFO, it is “intended to guide salmon allocation decisions by the department’s managers and provide stakeholders with more certainty and predictability in the approaches that will be used.”²⁵²

The Salmon Allocation Policy contains a Salmon Allocation Framework, which sets out seven principles for the allocation of salmon, described by Mr. Grout as “the key drivers for the way we [DFO] manage the fisheries.”²⁵³ The principles, with some of the surrounding language, are as follows:

Conservation – Conservation of Pacific salmon stocks is the primary objective and will take precedence in managing the resource – conservation will not be compromised to achieve salmon allocation targets.

First Nations – After conservation needs are met, First Nations’ food, social and ceremonial requirements and treaty obligations to First Nations have first priority in salmon allocation.

Common Property Resource – Salmon is a common property resource that is managed by the federal government on behalf of all Canadians, both present and future.

Recreational Allocation – After conservation needs are met, and priority access for First Nations as set out in Principle 2 is addressed, recreational anglers will be provided:

- priority to directed fisheries on chinook and coho salmon; and
- predictable and stable fishing opportunities for sockeye, pink and chum salmon.

Commercial Allocation – After conservation needs are met, and priority access for First Nations as set out in Principle 2 is addressed:

- the commercial sector will be allocated at least 95 per cent of combined commercial and recreational harvest of sockeye, pink and chum salmon; and
- the commercial harvest of chinook and coho will occur when abundance permits.

Selective Fishing – To encourage selective fishing:

- a portion of the total available commercial catch will be set aside for existing commercial licence holders to test alternative, more selective harvesting gear and technology; and,
- over time, commercial allocations will favour those that can demonstrate their ability to fish selectively.

Gear Allocations – Target allocations for the commercial sector will be:

- established on a coast-wide basis by gear, with the catch of all species expressed on a sockeye equivalent basis; and,
- subject to adjustments over time to account for conservation needs, including selective fishing, and possible changes resulting from the Voluntary Salmon Licence Retirement Program.²⁵⁴

Building on the recommendations from Dr. May, Mr. Toy, and Mr. Kelleher, the Salmon Allocation Policy contains a provision that “an impartial board with coast-wide responsibilities will be established to advise and assist the Minister in implementing this salmon allocation policy.”²⁵⁵ According to the policy, the allocation board was to be established in the calendar year 2000. It has never, however, been established.

Inter-sectoral allocation

The Salmon Allocation Policy deals with both recreational and commercial fishing and with inter-sectoral allocation among First Nations fishing for FSC purposes by allocating FSC purposes priority over other uses of the salmon resource. Between commercial and recreational fishers, the Salmon Allocation Policy recognizes the following:

Recreational and commercial salmon fisheries operate very differently. The recreational fishery accounts form a relatively small portion of the total annual harvest of salmon. It is primarily concerned with the quality of the angling experience and with the opportunity to fish throughout the year. In contrast, the commercial fishery,

which takes place mainly from July to November, accounts for the vast majority of the total salmon harvest and is primarily concerned with the quantity and value of the catch.²⁵⁶

Principle 4 grants recreational harvesters priority access to chinook and coho salmon, and it also limits the recreational harvest of sockeye, pink, and chum salmon “to a maximum average of 5% of the combined recreational and commercial harvest of each species over the period 1999 to 2005.”²⁵⁷ The Salmon Allocation Policy also contains provisions regarding the catch limits in the recreational fishery for sockeye, noting that “typical limits” for sockeye (combined with pink and chum salmon) will be established as follows:

- Tidal Waters: a daily limit of four salmon with a possession limit of eight salmon;
- Non-Tidal Waters (adults): a daily limit of two adult salmon and a possession limit of four adult salmon;
- Non-Tidal Waters (jacks): a daily limit of four salmon and a possession limit of eight salmon.²⁵⁸

I heard evidence that, because the recreational catch averages less than 5 percent, the Salmon Allocation Policy’s allocation of a maximum of 5 percent of the combined harvest to recreational fishers is still used in most years,²⁵⁹ but that the policy might not work if the recreational catch were to increase.²⁶⁰ However, a decrease in the commercial harvest automatically lowers the cap for recreational fishing. In years of low abundance, recreational fishers may reach the cap earlier, even if taking fewer fish than in previous years. As a result, there is tension between the commercial and the recreational sectors regarding the Salmon Allocation Policy Principle 4 priority of chinook and coho salmon to recreational fishers.²⁶¹

Allocation to Aboriginal fisheries

DFO manages allocations in the Aboriginal fishery by providing a given Aboriginal organization access to a certain number of fish, whether presented as an absolute number or calculated as a percentage of the TAC. According to Kaarina McGivney, former

regional director, Treaty and Aboriginal Policy and Governance Directorate, having allocations is important because they facilitate fisheries management. She said that having an agreed amount of access provides some stability and understanding for fisheries management.²⁶²

DFO states that Aboriginal fishing allocations are reached by negotiation with Aboriginal organizations.²⁶³ In these negotiations, DFO staff are provided with “mandates” setting out the maximum number of fish and funding that may be agreed to at a given negotiation.²⁶⁴ Since 2007, the mandates associated with the FSC fisheries of individual British Columbia Aboriginal groups have been determined by the regional director general.²⁶⁵ Before that, they were set in Ottawa.²⁶⁶ Mandates associated with the economic opportunity fisheries continue to require approval from the minister.²⁶⁷ According to Barry Huber, Aboriginal affairs advisor, BC Interior, DFO, mandates are reviewed annually and can be adjusted if necessary.²⁶⁸

Mr. Huber also told me that mandates are not disclosed to Aboriginal groups, as doing so would detract from the negotiations under way. He said that each negotiator needs flexibility,²⁶⁹ and laying all the “chips on the table” at the start is not a good way to negotiate because it “forces you to be positional right off the bat.”²⁷⁰ At the end of the negotiations, the agreement reached may include fewer FSC fish or less funding than is stipulated in the mandate, though most are at the top of mandate levels.²⁷¹

The Aboriginal Fisheries Framework contains an articulation of the overall percentage of the available salmon harvest that is to be allocated to First Nations.²⁷² The actual percentage was not disclosed to the Commission. When I ordered that this percentage allocation be disclosed, I was provided a certificate from the clerk of the privy council certifying that the information and related documentation was a cabinet confidence.

Despite not knowing the percentage of salmon allocated to First Nations in the Aboriginal Fisheries Framework, I did hear evidence on how this percentage is used. According to Ms. McGivney, the percentage allocation covers both FSC fishing and Aboriginal communal fishing for economic purposes.²⁷³ The percentage is to be achieved on average, over a number of years, recognizing that, in years of low salmon returns,

the Aboriginal FSC fishery may form a higher percentage of the catch.²⁷⁴

According to DFO's Aboriginal Fisheries Framework, on a year-to-year average,²⁷⁵ Aboriginal FSC and economic opportunity fisheries are allocated approximately 30 percent of the total salmon harvested in British Columbia.²⁷⁶ In contrast, the First Nations Panel on Fisheries recommended in its 2004 report, *Our Place at the Table: First Nations in the B.C. Fishery*, that the government immediately transfer a minimum of 50 percent of all fisheries to First Nations, with the potential that the total may reach 100 percent in some fisheries.²⁷⁷

Commercial communal Aboriginal allocation

In addition to FSC fishing access, Aboriginal Fisheries Strategy agreements between DFO and individual Aboriginal groups may provide for communal commercial fishing opportunities. From 1992 until 2003, DFO provided communal commercial Fraser River sockeye fishing access to certain Lower Fraser Aboriginal groups through DFO's Pilot Sales Program.²⁷⁸ Since 2004, DFO has provided communal commercial fisheries access through "economic opportunity fisheries."²⁷⁹ (DFO's Pilot Sales Program and economic opportunity fisheries are described in more detail in the Aboriginal fishing policies and programs section later in this chapter.)

In 2010–11, a total of 379 communal commercial licences were issued for salmon.²⁸⁰ The number of fish allocated to an Aboriginal group for communal commercial fishing is determined by negotiation between DFO and the group. In preparing for these negotiations, DFO gives its staff "mandates" for communal commercial allocations.²⁸¹ The Allocation Strategy within the Aboriginal Fisheries Framework states that the allocation of communal commercial access must balance the department's objective of supporting the economic development objectives of First Nations communities and the interests of all fishery participants.²⁸² In addition, communal commercial Fraser River sockeye allocations have been provided to support in-river fisheries, as described below in the section on terminal fisheries.

Commercial intra-sectoral allocation²⁸³

Principle 7 of the Salmon Allocation Policy (allocations by gear) adopted the initial coast-wide allocation targets for different commercial gear types (expressed as percentages of TAC)* recommended in the Kelleher Report: 34 percent gillnet, 42 percent seine, and 24 percent troll.²⁸⁴ These numbers were adjusted in early 2000, after the second licence buy-back program, to 38 percent gillnet, 40 percent seine, and 22 percent troll.²⁸⁵ These coast-wide target allocations are translated, on an annual basis, into licence area target allocations.²⁸⁶ These annual target allocations are expressed in sockeye equivalents, based on the previous year's average price by species.²⁸⁷

DFO divides the entire coast into 21 production areas (e.g., "South Coast Sockeye – Area 23" is a production area), identifies the major stock of harvest, and projects the number of fish that will be harvested in each production area.²⁸⁸ It looks at the market value of the fish, based on the previous year, and turns each fish into a "sockeye equivalent" (e.g., one chinook might be worth five sockeye, whereas one pink might be worth only a fraction of one sockeye). In this way, DFO can determine the value of the projected harvest, based on sockeye equivalents, for each production area. Mr. Grout described the process:

What we do to determine sockeye equivalents is it's relying on a landed value of the harvest from the previous season. So for the 2009 planning we're looking at the sockeye equivalents from the 2008 season. It relies on the landed value of the catch, and the landed price per kilogram or pound, and the average weights of those species. And ... then it's converted into sockeye equivalents, looking at the relative value of each species compared to sockeye on a coast-wide basis.²⁸⁹

The sockeye equivalent for a particular fish species is calculated as follows:

- Sockeye equivalent = (price / fish) ÷ (price / sockeye)

* TAC in this context means the Canadian commercial TAC specific to Fraser River sockeye.

- Price / fish = landed value by species ÷ total catch by species²⁹⁰

Each year in April, DFO meets with the CSAB to consult on how the coast-wide target allocations will be translated into licence area target allocations.²⁹¹ The annual consultation on allocation starts with a model table prepared by DFO which reflects the previous year's shares, the projected harvest, and the value of the catch in sockeye equivalents for each production area. The model is updated during the course of the meetings; different scenarios can be run as necessary to explore different allocation options. At the end of the meeting, DFO seeks an agreement on the percentage shares of each licence area for each production area.²⁹² This summary then becomes Appendix 4 of the IFMP for salmon.²⁹³ It is the formal allocation plan for the year, broken down by species / production area and licence area / gear type.

The commercial fishers who testified were critical of the allocation process because it is not always possible to achieve the target percentage split of the TAC among the sectors – a criticism that was acknowledged by Mr. Grout.²⁹⁴ Mr. McEachern told me that he thinks “the system is broken.”²⁹⁵ He identified the problem as a coast-wide allocation strategy imposed on area licensing which, because licence holders are restricted to fishing in a particular area, prohibits trades across licence groups.²⁹⁶

[W]e have a coast-wide allocation division of an economic pie that requires us to be able to move fish around, but we are geographically restricted by our individual licences [so] that if there is an imbalance, as it was explained, you can't access that fish. So we end up every year going through a process of trying to resolve differences in share of catches that aren't possible to achieve because of the structure of the area licensing in coast-wide allocation.²⁹⁷

Ms. Scarfo criticized the allocation process on the basis that the process lacks guiding principles: there are conflicting priorities, she said, and “a complete lack of direction from government.”²⁹⁸ Dennis Brown, a former commissioner of the

Pacific Salmon Commission and author of the book *Salmon Wars*, described it as “highly problematic in the industry at this time.”²⁹⁹

Other commercial allocation considerations

The Salmon Allocation Policy also states that target allocations are not guaranteed, and no compensation is provided in the event that an allocation is not achieved.³⁰⁰ More specifically, “catch up / make up” adjustments to future target allocations will not be considered in the event that a fleet does not achieve its target allocation.³⁰¹ That is a departure from previous allocation methods. “Catch up / make up” is a method of accounting for fish among commercial groups whereby, if one group had to “give up” fish one year, efforts would be made to pay it back in terms of allocation in a subsequent year.

DFO did not accept Mr. Kelleher's recommendations on deficit-surplus accounting; instead, the Salmon Allocation Policy expressly states that “catch up / make up provisions would seriously complicate salmon fishery management and potentially conflict with conservation goals and selective fishing priorities.”³⁰² Although I heard from one commercial fishing witness that it was preferable to return to a catch up / make up approach, Mr. Grout, speaking on behalf of DFO, was of the opinion that it would be extremely complicated to revert to this approach.³⁰³

Selective fishing in the commercial fishery under the Salmon Allocation Policy

As one of its seven principles, the Salmon Allocation Policy expressly sets out in Principle 6 to encourage selective fishing:

For a two-year period (1999–2000), up to 5% of the total available commercial catch will be available to commercial licence holders who wish to experiment with alternative fishing gear and technology such as salmon traps, fish wheels and tooth tangle nets. The results of these fishing trials will be reviewed and evaluated. At the end of the two-year period, the adequacy of the allocation for experimental trials will be assessed and revised if necessary.

Initial longer-term allocations to alternative gear and technology will also be considered at that time.³⁰⁴

Selective fishing is “the ability to avoid non-target fish, invertebrates, seabirds, and marine mammals or, if encountered, to release them alive and unharmed”³⁰⁵ (selective fishing is discussed further in the selective fishing section below). Under the Salmon Allocation Policy, selective fishing experiments were to have priority over existing commercial fisheries and, “[o]ver the longer term, target allocations for seine, gillnet and troll gear will ... reflect the relative ability of each gear type to harvest selectively through modification of existing gear and fishing operations.”³⁰⁶

The target allocations under the Salmon Allocation Policy have not been adjusted away from the “Kelleher formula” to reflect the relative selectivity of different gear types. Instead, fleets using less-selective methods may be unable to access their allocation if, for example, their fishery is closed because of a high risk to stocks of concern.

Status of allocation

The Salmon Allocation Policy remains the operating policy document for guiding salmon allocation.³⁰⁷ Recently, DFO revived the Allocation Implementation Committee, as discussed above, to address some issues of modernizing the Salmon Allocation Policy.* For example, this group may deal with the problem of how to address recreational fishers going beyond the 5 percent cap for sockeye in years of poor returns when the commercial harvest is low.³⁰⁸ In addition, DFO has received some funds from Pacific Salmon Treaty negotiations (approximately \$1 million) for modernization of the Salmon Allocation Framework.³⁰⁹

While I made no recommendation regarding the existing allocations between the commercial and recreational sectors, later in this chapter, I discuss the Aboriginal Fisheries Framework and

its potential to significantly influence the future allocation of the Fraser River sockeye fishery. The findings I make and related recommendations are discussed in Volume 3.

■ Management of the recreational fishery

Ms. Adams described salmon fishing in the recreational fisheries as the “critical backbone of the recreational fishing community in both marine and in freshwater.”³¹⁰ She told me that British Columbia’s marine recreational fishery is the largest in the country – both in angler days and in the “economic analysis related to that.”³¹¹ People spoke positively about the recreational fishery in this province.

DFO controls the recreational fishing of Fraser River sockeye; there is no direct involvement by the Fraser River Panel. The annual IFMP, which is discussed below, governs the recreational fishery and contains DFO’s recreational fishing plan for the year.³¹² DFO states there that recreational fishing opportunities are regulated by the *British Columbia Sport Fishing Regulations, 1996*, and that the regulations are summarized in the *Tidal Waters Sport Fishing Guide* and the *Freshwater Salmon Supplement*.³¹³ The recreational fishery for sockeye will be opened once DFO has established that conservation and FSC needs have been met.³¹⁴

Two DFO employees responsible for the recreational fishery, Deborah Sneddon, acting program coordinator, Lower Fraser Area Resource Management, and Joe Tadey, biologist and program head, Recreational Fisheries Program, told me that the most common tools DFO uses to manage the recreational sockeye fishery are its authority to set openings and closings of the recreational fishery, to establish daily limits and possession limits, and to determine whether a given recreational fishery will be a retention or non-retention fishery.³¹⁵

* On December 23, 2011, DFO issued a press release, “Federal Fisheries Minister Announces Licence Retirement Program for B.C.’s West Coast Chinook Salmon Fishery” (on website), in which it states: “The \$30-million mitigation strategy also includes an initiative to modernize the Department’s commercial salmon allocation framework and funds to support economic development on the West Coast of Vancouver Island.” However, I had no evidence before me regarding DFO’s plans to modernize its Salmon Allocation Policy.

Ms. Sneddon said that, in recent years in making its management decisions, DFO has considered the impact of recreational fishing in a particular area.³¹⁶ For instance, the South Coast tidal water recreational sockeye fishery is considered a low-impact fishery because fishers are not concentrated in a small area to the point where their impact on particular stocks or species may be significant; however, the in-river recreational sockeye fishery in the area from Mission to Hope is considered a medium- to high-impact fishery because tens of thousands of fish may be harvested in this area by recreational fishers.³¹⁷

DFO has set out its approach to managing these recreational fisheries, including when there will be a sockeye retention fishery, in the *Decision Guidelines for the Recreational Fraser River Sockeye Fishery*:

South Coast Marine Waters, Fraser River downstream of Mission and Fraser River above Hope

These fisheries are viewed as low impact fisheries, therefore, allow sockeye retention in the tidal water recreational sockeye fishery, including the waters off the mouth of the Fraser once local First Nations FSC fisheries are taking place.

- The sockeye retention of fishery in marine waters by the recreational fishery would be permitted unless:
 - it is expected that FN FSC needs will not be met; or
 - conservation objectives (i.e. exploitation rate limits for Sakinaw, Cultus and Interior Fraser River coho) and sockeye escapement targets established in the IFMP will not be met.

Fraser River Non-tidal Waters (Mission Bridge to Hope Bridge)

This fishery is viewed as a medium to high impact fishery, therefore allow sockeye retention in the Fraser River from Mission to Hope:

- once in-river FN FSC open times are regularized (i.e. 72 hour set nets); and
- a harvestable surplus for recreational / commercial fisheries is expected.

Close the in-river recreational sockeye fisheries when:

- a change in formation leads to the expectation that FN FSC needs will not be met; or
- conservation objectives (i.e. exploitation rate limits for Sakinaw, Cultus and Interior Fraser River coho) and sockeye escapement targets established in the IFMP will not be met.³¹⁸

DFO has committed to providing 48 hours' notice of a closure to the recreational sockeye fishery, wherever possible, and to avoiding implementing any closure on a weekend or statutory holiday.³¹⁹

The Vision for Recreational Fisheries in British Columbia³²⁰

As a result of the 2005 Pacific Fisheries Reform process and documents, the recreational fishing sector advised DFO that there was no discussion or plan for recreational fishing.³²¹ That prompted DFO to work with the SFAB and the Province of British Columbia through the years 2007–9 to create a framework for the recreational fishery.³²² In January 2010, the minister approved the report, *A Vision for Recreational Fisheries in British Columbia, 2009–2013 (Vision)*.³²³

Ms. Adams stated that the *Vision* is “based on a national operational policy for recreational fisheries in Canada.”³²⁴ It is not an allocation policy, but “a plan to ensure progress toward a collective vision for the recreational fishery ... It is meant to serve as a framework for developing goals, initiatives and actions to support achievement of a collective vision for the recreational fishery in B.C.”³²⁵ The *Vision* contains nine principles and seven strategic goals, including the principle that “[t]he needs of the recreational fishery, such as for stable and predictable fishing opportunities, will be explicitly considered and clearly reflected in integrated fishery management plans.”³²⁶ It includes the following strategic goals:

Strategic Goal #1: Achieve healthy and productive marine and freshwater ecosystems that support recreational fisheries[.]

Strategic Goal #2: Realize the full social and economic potential of the recreational fishery.
...

Strategic Goal #4: Ensure that the management of the recreational fishery is based on the best available information while taking into account local and traditional knowledge.

Strategic Goal #5: Provide sustainable fishing opportunities which consider the needs of and foster the potential of the recreational fishery.³²⁷

Ms. Adams told me that, in conjunction with the *Vision* document, DFO developed an action group (working with the recreational fishing community and with Province of British Columbia staff) to identify the most important issues facing the recreational fishery, focusing on communication, education, access and allocation, and improvement of information and catch accounting.³²⁸

■ Pre-season planning: introduction

As I mention earlier in this chapter on the management of the Fraser River sockeye salmon fishery, during the pre-season planning stage, DFO scientists prepare models forecasting the abundance of the returning stocks as well as the timing and movement of the four returning run-timing groups. DFO scientists also generate spawning escapement targets through the Fraser River Sockeye Spawning Initiative. In this section I review these models, how they are generated, and how they are used.

In the pre-season stage, both DFO and the Fraser River Panel prepare pre-season fishing plans. For DFO, it is the IFMP. In an effort to illustrate the complexity of the pre-season planning and the different entities and processes involved, Commission staff prepared the diagram set out in Figure 1.5.9.

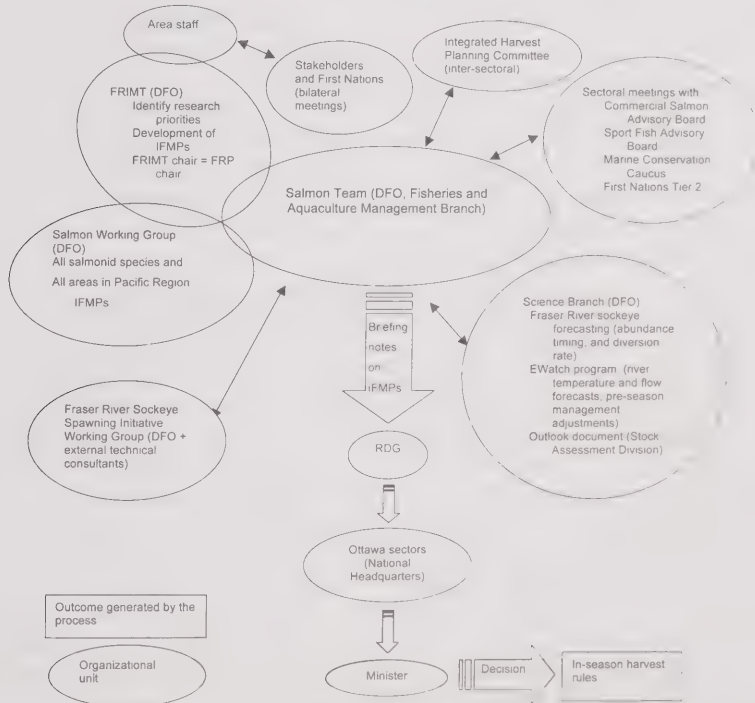


Figure 1.5.9 Pre-season planning

Note: FRIMT: Fraser River Sockeye and Pink Salmon Integrated Management Team (DFO); FRP: Fraser River Panel; IFMPs: Integrated Fisheries Management Plans; RDG: regional director general.

Source: Commission staff.

As part of its annual pre-season planning, DFO produces the Salmon Stock Outlook, a document that is “intended to provide an objective and consistent context within which to initiate fisheries planning ... it provides a preliminary indication of salmon production and associated fishing opportunities by geographic area and species (or a stock group).”³²⁹ As Mr. Grout, regional resource manager, Salmon, DFO, testified before me:

The intention of the document is to provide a broad scan of the status category on a scale of 1 to 4 for a number of salmon stocks in the region ... [T]here [are] four status categories, from status 1 being a stock of concern ... The criteria are somewhat subjective, but they’re meant to give you an indication of stocks that are less than 25 percent of their target where [it has been] identified or has been declining rapidly, up to a category 4 population which is considered abundant and is forecast to be well above target.³³⁰

The Salmon Stock Outlook is typically updated from December through February as new information becomes available and is made public through DFO’s advisory processes with the IHPC, the CSAB, and the SFAB, and other groups (as discussed above). The Salmon Stock Outlook is a prelude to forecasts.³³¹

The Pacific Salmon Treaty requires DFO to provide the Fraser River Panel with pre-season forecasts of run size, run timing, and diversion rates. It also stipulates that DFO is responsible for establishing annual spawning escapement targets for Fraser River sockeye.³³²

Harvest decision guidelines for Fraser River sockeye are set out in each year’s IFMP for South Coast salmon. DFO pre-season planning is complete when DFO releases the final IFMP around the end of June.

■ Forecasting

DFO produces pre-season forecasts of the run size, the timing of the runs, and the “diversion rate” of the returning sockeye.³³³ This section provides an overview of DFO’s annual forecasting

process and the methodology used to prepare the forecasts.

Once DFO’s forecasts are received, the Pacific Salmon Treaty stipulates that the Fraser River Panel will determine the probability level of the forecast that will be used in planning the fisheries. Typically it is the median value of 50 percent probability, unless there is agreement otherwise.³³⁴

Mr. Rosenberger, who is co-chair of the Fraser River Panel, described the importance of the forecasts: “It’s key for us in pre-season planning and also in our in-season works in understanding the linkages of timing, distribution, stocks of concern ... [I]t gives us that relative magnitude and understanding about which stocks we think we can harvest.”³³⁵

In Technical Report 7, Fisheries Management, the authors made the following recommendation regarding pre-season forecasting: “The analytical resources currently allocated to preparing pre-season forecasts should be re-allocated to defining a clear set of escapement goals and in-season management models that will assist managers in fisheries planning and the achievement of these goals.”³³⁶ However, during the hearings on this report, Karl English, its primary author, agreed that pre-season forecasts are useful in managing Fraser River sockeye, as they provide information to assist in setting initial fishing plans.³³⁷

Forecasting: run size

Mr. Lapointe said that DFO generally provides the Fraser River Panel with its initial run size forecasts at the panel’s meeting in February and with its final pre-season run size forecasts in April.³³⁸ DFO’s Science Branch is responsible for preparing the forecasts.

Both DFO and the Pacific Salmon Commission acknowledge that the forecasts are not intended to provide certainty but are important for supplying context and the range of scenarios used in the contingency planning for the fishery.³³⁹ Mr. Lapointe told me, “The model predicts a distribution. It doesn’t predict a number.”³⁴⁰ Mr. Rosenberger admitted that, because DFO has had difficulty communicating the nature of the pre-season forecast, it is making efforts to let it be known that the forecasts

reflect a “probability distribution” – a range of possible outcomes.³⁴¹

DFO staff prepare the forecasts using different models which present a range of outcomes. The Salmon Sub-Committee of DFO’s Centre for Science Advice, Pacific, a peer-review process that involves DFO scientists as well as members of the public, reviews the forecasts (see Chapter 4, DFO overview).³⁴² Once accepted by CSAP, the authors present their conclusions and recommendations for the forecasts in the annual Canadian Science Advisory Secretariat (CSAS) Science Advisory Reports, which summarize each season’s run forecast.³⁴³ The Science Advisory Report is presented to DFO management and becomes DFO’s official record of science advice. The methodology for the run size forecast is developed through the CSAP process.³⁴⁴

DFO provides the forecasts to the Fraser River Panel and the Pacific Salmon Commission (as well as to First Nations and fisheries stakeholders), who use the forecasting information for pre-season planning purposes and for developing potential fishing plans.³⁴⁵ The forecasts offer DFO and the Fraser River Panel a starting point for their planning discussions and allow them to work out disputes and issues that may arise if certain scenarios were to occur – to assess various “what if” scenarios.³⁴⁶ The forecasts provide detailed information on the range of returns expected for salmon, as well as specified probability levels to indicate the uncertainty of the potential returns.³⁴⁷ The forecasting models are not intended to accurately predict a certain return for any stock but to provide “an idea of the range of returns that are possible for the population and the probabilities of those returns occurring.”³⁴⁸

Mr. Grout said that “the information is used at the Fraser River Panel for pre-season planning purposes and for developing potential fishing plans for the various groups if, in fact, a specified return level were to occur during the upcoming season.”³⁴⁹ He explained that the panel also uses the pre-season forecasts early in the fishing season, before reliable in-season estimates are available, to determine if the fish are returning as expected. That is done by comparing the very early season returns to the forecast and determining whether there is much of a discrepancy.³⁵⁰

DFO develops the run size forecast using a series of models for each of the 19 identified

stocks, as well as some of the miscellaneous stocks. According to DFO scientist Sue Grant, program head, Sockeye and Pink Analytical Program (which falls under DFO Science’s Stock Assessment Section), DFO conducts its pre-season run size forecasts for these stocks because they account for 95 to 98 percent of the total abundance in the Fraser River watershed. Ms. Grant told me that DFO has data on “stock” (female spawner abundance and spawner success) and “recruitment” (catch plus escapement) for the 19 forecasted stocks. She said that, for the “miscellaneous” stocks forecasted, DFO has only escapement data.³⁵¹

The run size forecasting models are computer generated and typically fall into one of two categories: biological models and “naive” (statistically based) models. The models use historical escapement and productivity data collected from past returns to predict what might happen if runs follow traditional patterns.

Biological models rely on historical information about stock recruitment. For the historically identified sockeye stock, that phrase means the estimated total number of adult sockeye returning to the spawning grounds from the marine environment and originating from a spawning event that occurred three, four, or five years before their return. Ms. Grant described biological models, including the information that is considered to be a variable (something that will affect the estimates), as follows:

[T]hese models incorporate ... the stock and recruitment time series. [They] establish a relationship between the spawner abundance and the recruits, the resultant recruits ... the core data that would go into these models ... [is] paired stock and recruitment data. So that’s escapement data, so it’s paired, and that’s fundamental to the models.

...

Escapement is being used as a predictor variable in the models.

...

And then the other piece of data that we use for the 19 forecasted ... stocks in terms of biological models is also environmental variables. So specifically for biological models we can also incorporate environmental variables into the models. And these include things like sea surface temperature, Fraser discharge, et cetera.³⁵²

Mr. Rosenberger and Ms. Grant noted, however, that even though DFO has tried to see if environmental variables might be used in the forecasting process, it has not “had a lot of success so far on that.”³⁵³

The assumption that future production will be similar to levels experienced in the past is implicit in the use of abundance information and historical stock-recruitment relationships to estimate future abundance.³⁵⁴

The other forecasting models are referred to as naive models and are based purely on statistical information. As described by Ms. Grant:

[H]istorically we’ve called them naive models, because these models don’t establish any relationship between the spawning abundance and the resultant recruits, but instead are forecasting abundance based on summarizing the time series data that we have.

[O]ne example of a naive model would be a time series average model, what we call a TSA ... The TSA model ... would just average the returns over the historical time series, and use that average to predict what we would see next year. So next year’s return would simply be the average of the historical time series.³⁵⁵

In Ms. Grant’s opinion, the stock recruitment data available to DFO for running the models to forecast the run size of Fraser River sockeye is “globally accepted as being amongst the best stock recruitment time series for salmonids ... throughout the world.” However, Ms. Grant acknowledged that run size forecasting would be improved if DFO had more research on “the survival part of the whole stock recruitment relationship, understanding what are the mechanisms driving survival for Fraser sockeye.” In her view, this information “would include research in the freshwater environment and the marine environment.”³⁵⁶

The run size forecast models necessarily include uncertainties, given the nature of the data available to DFO. Ms. Grant agreed that information about the young sockeye – “smolt data” – would be extremely useful in forecasting and would eliminate some uncertainty:

[I]f we forecast with smolt data, we are eliminating all the uncertainty and survival in the freshwater environment.

[I]f we’re just forecasting with adult spawners that return to the spawning ground, we’re forecasting the future based on all of the uncertainty we have with freshwater survival, as well as marine. When we have smolt data, we’re eliminating that uncertainty. We ... have a better starting point because we’re further ahead in the life history.³⁵⁷

DFO has smolt data on the Chilko stock, which it relies on as an indicator stock. DFO also has data on the Cultus Lake stock for some years.³⁵⁸ Using Chilko as an indicator stock means that it can “partition total survival into freshwater ... and marine ... [DFO can] look at what fresh-water survival was like, and marine survival, and see where that occurred.”³⁵⁹ Ms. Grant agreed that “in a perfect world it would be better to have more indicator stock data to give [DFO] a better handle on more than one stock in regards to being able to figure out if there’s a survival breakdown, [and] where [it] is ... occurring, in the freshwater or the marine environment.”³⁶⁰

Ms. Grant also acknowledged the uncertainties associated with the DFO run size forecasting models, highlighting the problem with estimating a given stock’s escapement (particularly where there are no resources to use a counting fence):

[A] lot of the escapement enumeration programs don’t employ fences because they can’t ... [T]hey use a range of methods to enumerate on the spawning grounds, from mark-recapture studies or visual surveys from helicopter flights ... and there’s going to be uncertainty in the core data we’re using from that perspective.³⁶¹

Uncertainty is also apparent in other aspects of forecasting. Ms. Grant described three further areas of uncertainty: recruitment data (which she described as “catch plus escapement”), variability in inter-annual survival, and variability in the model form itself. She testified:

You’ll have the escapement uncertainty, as well as uncertainty in the catch estimates, because catch is assigned to the different stocks through assessing catch and doing some analysis on the animals being caught in the fisheries, and assigning them based on a

sample to the different stocks ... So that's just classic observation error in the models.

The other kind of error ... or uncertainty in the models is associated with uncertainty and variability in inter-annual survival. So we use different models to explain recruitment. So brood year escapement, environmental variables, but there's always going to be a certain component of that inter-annual variation and survival that we cannot explain. And, that is also a component of uncertainty in the models, the variation in recruitment over time.

And the model forms themselves are part of the uncertainty, given ... you're exploring a lot of different forms of models that are capturing stock recruitment dynamics in different ways, so there's uncertainty in the model form that you're using, as well. So I would say those would be the key uncertainty elements to the forecasts.³⁶²

To clarify how DFO determines the run size forecast models it will choose, Ms. Grant reviewed the document, "Pre-Season Run Size Forecasts for Fraser River Sockeye for 2006."³⁶³ The document sets out the methodology used by DFO's forecasters in determining which forecasting models they will follow:

- 1) choose candidate forecast models depending on data availability;
- 2) perform a retrospective analysis for each stock by sequentially forecasting abundance for years with observations of abundance;
- 3) evaluate model performance by comparing the retrospective forecasts with the abundance observations based standard performance criteria;
- 4) [i]dentify the "best" forecast model from step 3 and present forecasts as posterior distributions of returns in 2006.³⁶⁴

Ms. Grant described the first step as a process of selecting "the suite of models for each stock that could be explored, limited by the data that's available" (as described earlier).³⁶⁵ The second step in choosing the particular forecasting model requires a ranking of all the possible models for a particular stock, based on a retrospective analysis (looking back at how the stock has performed historically). Ms. Grant described this process:

The models that have the smallest difference between the forecasts and the true returns ... perform better in retrospective analysis. So we look at the performance of the models and compare how each one is doing through time compared to the true return time series. And we create a ranking for all the candidate models for a particular stock, and then we're ranking them, based on this retrospective analysis, from 1 to total number of models that exists.³⁶⁶

From this ranking, DFO selects its "best" forecast model, which is the top-ranked model of its forecasts. As Ms. Grant noted, "[T]here is not one model which performs optimally across all stocks, and even across one stock through time. So generally if you look at a forecast table, there will be a range of different models being used to generate forecasts for different stocks."³⁶⁷ A considerable degree of uncertainty continues to be associated with the forecasts, though those models that take into account the recent declines in Fraser River sockeye productivity tend to perform better than those that are looking at the entire historical time series.³⁶⁸

Change in 2010 run size forecasting

As I discuss above, the models operate within the parameters of past performance over time. In other words, it is assumed that what has happened in the past will reflect what will happen in the future. In 2009 this assumption was demonstrated to be problematic in that the forecast was far higher than the actual returns. This shortfall led DFO to reconsider the appropriate data sets to be used in the forecast models.

In 2010, DFO changed its run size forecasting models because of the observed decline in the productivity of Fraser River sockeye. Ms. Grant and Mr. Rosenberger explained that DFO had noted persistent declines in sockeye productivity and, in 2009, saw the lowest returns on record.³⁶⁹ That decline led DFO to include in its forecasts "alternative assumptions about ... the survival of Fraser sockeye ... in light of declines in productivity."³⁷⁰ Mr. Lapointe described this decision as a "paradigm shift."³⁷¹ Mr. Rosenberger explained the changes to the 2010 forecasting models:

We'd been ... looking at trying to expand the range of models and options to be used in forecasting. And so in [2010], there were models that ... truncated the data-set so they used a portion of it ... four-year models, eight-year models and [Kalman] filter models were added as options [to] ... those that could be used for making the predictions.³⁷²

The first table in the 2010 forecast document described the results of the models forecasting the

2010 Fraser River sockeye return using a data set restricted to data from more recent years. The results are set out in Table 1.5.3. The second table described the 2010 forecast results using the long-term average productivity (that is, using the entire data set), which was how the 2009 forecast and all previous forecasts were generated. Table 1.5.4 contains the results. The third table described the results forecasting the 2010 returns using the productivity seen in the 2005 brood year (which spawned the 2009 returns). Table 1.5.5 contains the resulting forecast.

Table 1.5.3 “Recent Productivity” 2010 forecast table by stock and timing group (condensed from Grant et al. 2010, Table 2)

Run Timing Group Stocks	Mean Run Size		Probability that Return will be at/or Below Specified Run Size ^a				
	all cycles ^b	2010 cycle ^c	10%	25%	50%	75%	90%
Early Stuart	304,000	113,000	17,000	26,000	41,000	66,000	101,000
Early Summer	--	--	174,000	374,000	783,000	1,601,000	3,047,000
<i>(total excluding miscellaneous)</i>	<i>(504,000)</i>	<i>(797,000)</i>	<i>(129,000)</i>	<i>(269,000)</i>	<i>(581,000)</i>	<i>(1,251,000)</i>	<i>(2,543,000)</i>
Bowron	21,000	20,000	400	700	1,300	2,500	4,600
Fennell	29,000	26,000	9,000	16,000	31,000	56,000	90,000
Gates	59,000	17,000	2,000	4,000	9,000	17,000	33,000
Nadina	79,000	22,000	9,000	16,000	30,000	60,000	107,000
Pitt	60,000	55,000	7,000	12,000	26,000	53,000	96,000
Raft	33,000	16,000	7,000	13,000	24,000	42,000	71,000
Scotch	73,000	248,000	40,000	106,000	265,000	640,000	1,450,000
Seymour	150,000	393,000	55,000	101,000	195,000	380,000	691,000
Misc ^d	--	--	13,000	58,000	134,000	242,000	302,000
Misc ^e	--	--	7,000	10,000	14,000	22,000	42,000
Misc ^f	--	--	24,000	35,000	48,000	76,000	144,000
Misc ^g	--	--	1,000	1,000	4,000	6,000	10,000
Misc ^h	--	--	0	1,000	2,000	4,000	6,000
Summer	5,332,000	5,059,000	1,045,000	1,605,000	2,612,000	4,343,000	6,894,000
Chilko	1,740,000	1,900,000	864,000	1,273,000	1,958,000	3,011,000	4,435,000
Late Stuart	750,000	396,000	8,000	21,000	60,000	169,000	429,000
Quesnel	2,350,000	2,200,000	111,000	215,000	438,000	909,000	1,727,000
Stellako	492,000	563,000	62,000	96,000	156,000	254,000	393,000
Late	3,193,000	9,126,000	3,331,000	5,023,000	8,003,000	12,305,000	19,695,000
<i>(total excluding miscellaneous)</i>	<i>(3,193,000)</i>	<i>(9,126,000)</i>	<i>(3,264,000)</i>	<i>(4,951,000)</i>	<i>(7,871,000)</i>	<i>(12,035,000)</i>	<i>(19,352,000)</i>
Cultus	17,000	18,000	5,000	6,000	9,000	14,000	19,000
Harrison	58,000	NA	53,000	97,000	195,000	429,000	1,167,000
Late Shuswap	2,210,000	7,640,000	3,101,000	4,652,000	7,252,000	10,791,000	16,702,000
Portage	55,000	90,000	8,000	18,000	42,000	99,000	221,000
Weaver	406,000	690,000	71,000	126,000	264,000	472,000	799,000
Birkenhead	447,000	688,000	26,000	52,000	109,000	230,000	444,000
Misc. non-Shuswap ⁱ	--	--	67,000	72,000	132,000	270,000	343,000
TOTAL	--	--	4,567,000	7,028,000	11,439,000	18,315,000	29,827,000
<i>(TOTAL excluding miscellaneous)</i>	<i>(9,333,000)</i>	<i>(15,095,000)</i>	<i>(4,455,000)</i>	<i>(6,851,000)</i>	<i>(11,105,000)</i>	<i>(17,695,000)</i>	<i>(28,890,000)</i>

a. probability that return will be at/or below specified projection. b. sockeye: 1980-2006 (excluding miscellaneous stocks). c. sockeye: 1980-2008 (excluding miscellaneous stocks). d. unforecasted misc. Early Summer Stocks (Early Shuswap stocks: S. Thompson); return timing most similar to Scotch / Seymour. e. unforecasted misc. Early Summer stocks (N. Thompson tributaries; return timing most similar to Fennell/Bowron/Nadina). f. North Thompson River. g. Nahatlach River & Lake. h. Chilliwack Lake and Dolly Varden Creek. i. unforecasted miscellaneous Late Run stocks (Harrison)

Note: This forecast incorporates new models that take into account recent productivities, rather than the entire historical data set. Model performance of old and new models were evaluated only for more recent brood years (1997-2004).

Source: Reproduced from Exhibit 341, p. 8.

The 2010 run size forecast also contained a change in the presentation of the different probabilities that convey forecast uncertainty: forecast probabilities are now described as the probability of returning at or below the specified forecast. In this arrangement, the lowest probability levels

(10 percent and 25 percent) are now associated with the lowest forecast. In other words, as Figure 1.5.10 indicates, the “old” 75 percent forecast is equivalent to the “new” 25 percent forecast. DFO considers this new format to be appropriate from a conservation perspective.³⁷³

Table 1.5.4 The “Long-Term Average Productivity” 2010 forecast table by stock and timing group
Probability of Return at/or Below Specified Run Size

Run Timing Group	10%	25%	50%	75%	90%
Early Stuart	55,000	85,000	135,000	213,000	315,000
Early Summer	387,000	723,000	1,518,000	3,544,000	7,993,000
Summer	1,434,000	2,304,000	3,972,000	6,981,000	11,875,000
Late	3,484,000	5,239,000	8,364,000	12,803,000	20,741,000
TOTAL	5,360,000	8,351,000	13,989,000	23,541,000	40,924,000

Note: These forecasts were produced using the methodology of previous years, including for 2009. Specifically, model forecasts use the first-ranked model based on retrospective analysis using the entire retrospective time series to calculate performance measures.

Source: Reproduced from Exhibit 341, p. 9.

Table 1.5.5 The “Productivity Equivalent to the 2005 Brood Year” 2010 forecast table by stock and timing group
Probability of Return at/or Below Specified Run Size

Run Timing Group	10%	25%	50%	75%	90%
Early Stuart	12,000	19,000	29,000	46,000	70,000
Early Summer	68,700	141,400	314,000	698,000	1,430,000
Summer	94,000	159,000	290,000	548,000	1,029,000
Late	645,000	1,243,000	2,842,000	6,586,000	14,068,000
TOTAL	819,700	1,562,400	3,475,000	7,878,000	16,597,000

Note: For a number of stocks, particularly Summer-run stocks that were predicted to return at high abundances, productivity for the 2005 brood year was among the lowest on record. These forecasts were produced by using preliminary productivity data (R/EFS or R/smolt) associated with the 2005 brood year (which resulted in the 2009 poor returns). At the time of this paper, 2009 returns data were preliminary and not available by each of the 19 forecasted stocks.

Source: Reproduced from Exhibit 341, p. 9.

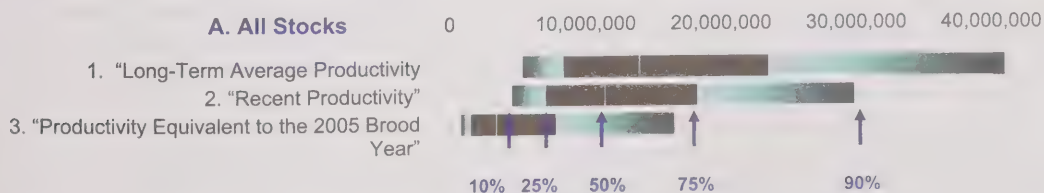


Figure 1.5.10 Pre-season run size forecast for 2010

Source: Exhibit 341, p. 6.

Although DFO's 2010 forecasts were criticized as being inaccurate, given the size of the return, Ms. Grant defended them, noting that they "were on the map in terms of long-term average productivity."³⁷⁴

Forecasting: run timing

DFO also forecasts the timing of the return of the runs and produces pre-season run-timing forecasts for the Fraser River Panel. The run-timing forecast is a "prediction of the median (i.e. 50%) return timing date," meaning the most probable calendar date when half of the run of a particular stock is expected to have passed by a specific geographic location on the return migration.³⁷⁵ Unlike the run size forecasts that are prepared for 19 identified Fraser River sockeye stocks, DFO produces pre-season run-timing forecasts for only two stocks – the Early Stuart and the Chilko stocks. Michael Folkes, salmon stock assessment biologist, Salmon Assessment Section, Salmon and Freshwater Ecosystems Division, Science Branch, Pacific Region, explained the rationale behind this limited timing forecast:

As the Early Stuart stock is the earliest of all four returning stock groups[,], its timing is monitored as the first indicator for overall Fraser sockeye return timing. There is a good historical record of Early Stuart run timing, which allows for more robust statistical relationship between timing and oceanographic indicators. The Chilko stock, part of the summer timing aggregate, has historically been numerically strong during each year of the four year sockeye generation[,], thus allowing for more data inclusion to the timing forecast model. This led to it being the stock of choice for timing evaluation.³⁷⁶

The run-timing forecasts are produced using a statistical methodology known as linear regression, which mathematically relates an independent variable (cause) to a dependent variable (effect). Currently, DFO uses two independent variables (ocean currents and sea surface temperature) to predict the dependent variable of median return timing date. The statistical "fitting" between cause and effect relies on historical data and is updated with each ensuing year.³⁷⁷

The uncertainty in the run-timing forecasts is referred to as a "prediction interval." In addition

to the forecast date, the DFO forecast memoranda will include "the historical time series median date, derived from the series of post-season dates ... which allows for some comparison of how far off the historical average the forecasted date may be."³⁷⁸

Forecasting: diversion rates

Fraser River sockeye travel south along the coast of British Columbia as they migrate (or return) to their spawning grounds in the Fraser River watershed. Historically, the majority of returning sockeye migrated through Juan de Fuca Strait (south of Vancouver Island). The diversion rate (sometimes referred to as the "northern diversion") refers to the percentage of migrating Fraser River sockeye that returns from the North Pacific Ocean through Johnstone Strait, thereby "diverting" from the traditional return route through Juan de Fuca Strait.³⁷⁹

DFO's forecast for the diversion rate is not stock specific but a total estimate, accounting for all Fraser River sockeye returns.³⁸⁰ DFO submits two forecasts of Fraser River sockeye diversion rates to the Fraser River Panel: the first in early June and the second in early July. Any in-season updates to the diversion rate estimate are prepared by the panel's Technical Committee (as opposed to DFO).³⁸¹

Mr. Folkes described the basis for the diversion rate forecast:

[I]t is likely that returning adult Fraser sockeye are responding to an environmental cue in the marine system, specifically temperature ... diversion rates relate to late spring sea surface temperature (SST) recorded at Kains Island lighthouse (NW Vancouver Island). While SST at this location is not likely the cue for Fraser sockeye, it may be a proxy for the true environmental cue. For example, SST at Kains Island may be reflective of temperatures that Fraser sockeye respond to while migrating through critical locations of the North Pacific.³⁸²

DFO bases its forecast diversion rate on the relationship between the average May and June sea surface temperature measured at Kains Island lighthouse in the given year and the estimated post-season diversion rates from 1977 to the previous year (e.g., for the 2010 year, it would be the estimated

post-season diversion rates for 1977–2009). Once a relationship between cause (SST) and effect (diversion rate) is estimated (by fitting the regression line), the fit is used to predict the upcoming diversion, given known ocean temperatures.³⁸³ Mr. Folkes attested that, beginning in 2009, the DFO diversion rate forecast memoranda include estimates of uncertainty around the forecast, “derived from published deterministic methods associated with the statistical model,” and are stated with a probability level – for example, “diversion forecast of 32%, with 50% probability the range is within 27%–42% and 95% probability the range is within 16%–59%.”³⁸⁴

Findings

I am satisfied that DFO’s pre-season forecasting serves a useful purpose in the management of the fishery, as it provides information which assists the Department of Fisheries and Oceans (DFO) and the Fraser River Panel to set fishing plans. DFO has made efforts to improve both the methodology of the pre-season forecasts and its communication of these forecasts to those involved and/or interested in the fishery.

■ Pre-season escapement target planning: Fraser River Sockeye Spawning Initiative

Introduction

Under the Pacific Salmon Treaty, DFO is responsible for establishing the annual spawning escapement targets for Fraser River sockeye and for providing these spawning escapement requirements by stock group to the Fraser River Panel.³⁸⁵ The data used in setting escapement targets (the stock and stock groupings) are the same as are used in forecasting, although the forecasting model is entirely distinct from the escapement target model. The Fraser River Panel uses the escapement targets to inform its pre-season harvest planning model and fishing plans, which I discuss later in this chapter. DFO and the Fraser River Panel also use the escapement targets to determine the total allowable catch (TAC) and, ultimately, fishery openings in-season.

DFO determines its escapement targets using a simulation model and stock and recruitment data; the model is known as the Fraser River Sockeye Spawning Initiative (FRSSI, pronounced “frizzy”).³⁸⁶ Al Cass, a DFO scientist and one of the creators of the FRSSI model, said that FRSSI affords a way to develop a rules-based system for determining harvest rates based on the estimated abundance of returning sockeye.³⁸⁷ He explained that, in setting escapement targets, DFO is balancing conservation and management of the fishery.³⁸⁸

Cyclic dominance

Some of the 19 Fraser River sockeye stocks demonstrate cycles with a predictable peak in abundance every four years; when this pattern is very pronounced it is called “cyclic dominance.”³⁸⁹ Dr. Jim Woodey, former chief biologist of the Pacific Salmon Commission, identified the following stocks demonstrating cyclic dominance: Quesnel, Adams, Lower Shuswap, Seymour, Scotch Creek, and Stuart.³⁹⁰ Cyclic dominance involves one large return year (the dominant line year), a subdominant line year (the year following the dominant year), and then two years where the abundance is considerably lower (varying from less than 1 percent of the dominant year abundance to a few percent of the dominant year abundance).³⁹¹ Cyclic dominance is well accepted, although the cause or trigger for it is still unknown. Dr. Woodey and Dr. Carl Walters, a fisheries professor at the University of British Columbia, agreed that cyclic dominance is most likely a biological phenomenon.³⁹² Cyclic dominance is an important factor for setting escapement targets for some stocks.³⁹³

Stock / recruitment modelling

FRSSI uses stock / recruitment modelling to represent population dynamics in the simulation model.³⁹⁴ Since the early 1970s, the statistical relationship between the number of spawners and the number of resulting recruits has been used as a basis for the escapement target forecasting models,³⁹⁵ even in light of the variability and uncertainty in the stocks.³⁹⁶

Fraser sockeye stocks are simulated into the future based on the historical relationship

between spawning escapement (i.e. number of adults in the brood year) and recruitment (i.e. number of 4 and 5 year old adults produced from that brood year).

...

Statistical methods have been developed to explain the relationship between spawners and recruits. For sockeye, these models typically calculate the expected number of age 4 and age 5 recruits resulting from each brood year, and combine these age classes into a projection of run size. SR [stock / recruitment] models usually predict increasing production of recruits as the number of spawners increases, eventually levelling off or declining as high spawner abundances exceed the capacity of the environment to sustain the offspring.³⁹⁷

The most widely applied model to quantify the population dynamics of Pacific salmon (including Fraser River sockeye) is the Ricker Model, generated by DFO scientist William Ricker at the Pacific Biological Station in 1954. The Ricker Model is based on historical stock and recruitment data and assumes that, when there are few spawners in a given brood year, there is no negative interaction due to overcrowding (population density) and, at a certain level, there will be a maximum production of recruits per spawner (known as maximum sustainable yield, or MSY).^{*} In the Ricker Model, as spawning abundance increases past the MSY point, the resulting number of recruits per spawner (productivity) decreases. The Larkin Model (or delayed density dependence model) was developed in 1971 and is essentially a modified version of the Ricker Model. It includes cross-cycle interactions, so considers the spawning abundance of the brood year as well as the spawning abundance one to three years earlier in the given stock.³⁹⁸

The latest version of the FRSSI model includes the use of the Larkin or delayed density dependent versions. Some researchers have suggested that the recent decline in productivity of Fraser sockeye is due to a management regime that

attempts to increase the spawning abundance across all cycle lines. In addition, delayed density dependence suggests higher exploitation rates than do the standard Ricker models. The FRSSI model has the capacity to explore implications of these alternative hypotheses.³⁹⁹

One criticism levelled against the use of stock / recruitment models to forecast and set escapement targets is the assumption that the relationship between spawners and recruits (productivity) is stable. Ken Wilson, a consulting fisheries biologist and a member of the Canadian Caucus of the Fraser River Panel and of the Marine Conservation Caucus, said:

My concern is a simple one. If you have 50 years of data and you're going to use those data to understand how a system behaves, you're making an assumption about how stable the relationships between the various factors that affect the population will be over that time period. 50 years of data may seem like a long time, but ... [i]s it representative of the 50 years going forward that the model's attempting to help us understand? And that's where the problem occurs in my opinion. Yes, I think that those data, to some degree, are an adequate representation of the past performance of these stocks. Whether the past performance of these stocks will enlighten us very much about the future performance of these stocks is really at the heart of the matter.⁴⁰⁰

Pre-1985 escapement target setting

Before 1985 (when the Pacific Salmon Treaty was signed), the International Pacific Salmon Fisheries Commission, the precursor to the Pacific Salmon Commission, generated escapement targets together with its forecasting document.⁴⁰¹ In preparing the escapement targets for Fraser River sockeye, it looked at stock-recruitment curves, trying to determine the maximum sustainable yield for the dominant stocks and then applying

* In setting escapement targets, the models will refer to the "maximum sustainable yield" (MSY), which, according to the witnesses, is the difference between the necessary escapement level in the return year and the return itself (as opposed to the point of escapement, which produces the largest run); it is also referred to as the "maximum average yield." See Jim Woodey and Carl Walters, Transcript, February 9, 2011, p. 16.

the same MSY to run-timing group / co-migrating smaller stocks. The targets were generated by cycle line. It was a fixed escapement policy: regardless of the return for a particular stock, the escapement goal would remain the same.⁴⁰² During this period, the IPSFC attempted to set escapement targets that rebuilt the sockeye stocks in a measured way, reflecting a gradual increase in the escapement over time instead of doubling escapement in any one population from one cycle to the next.⁴⁰³ However, this approach changed in 1985 when DFO took over setting escapement targets.

Rebuilding strategy or plan, 1987

With the enactment of the Pacific Salmon Treaty, DFO assumed responsibility for setting escapement targets for Fraser River sockeye. In 1987, it instituted a rebuilding strategy or plan⁴⁰⁴ – an attempt to rebuild escapement in order to increase the returns and the yield over a three- to four-generation period (for 12 to 16 years, from 1987 to 2002, approximately).⁴⁰⁵ The rebuilding strategy had certain interim goals (given the uncertainty of the cycle lines), such as reducing the harvest rate from 75 percent or higher to a maximum of 60–65 percent, in order to increase escapement in the hope of rebuilding stocks.⁴⁰⁶

A basic premise of the rebuilding plan was to increase escapements each year, beyond brood year levels, to maintain an increasing rebuilding trajectory towards interim escapement targets ... To meet rebuilding targets during years of low survival, a higher fraction of the run is allocated to escapement rather than catch.⁴⁰⁷

Mr. Brown, a former commissioner of the Pacific Salmon Commission and the author of the book *Salmon Wars*,⁴⁰⁸ was extremely critical of DFO's rebuilding plan. "[T]he stocks did the opposite to what the party line from DFO was saying," he testified. "They didn't rebound and improve, they declined calamitously."⁴⁰⁹

By the 1990s, DFO was not seeing the expected increases in the salmon stocks and had noticed that some stocks were starting to decline. Accordingly, the department initiated a review of its rebuilding strategy in 2002, which eventually led to FRSSI:

DFO initiated a review of the rebuilding strategy prior to the 2003 fishing season to address the growing concern about its appropriateness during a time of reduced productivity and dwindling abundance. The mandate of the review process was to incorporate new information, integrate emerging policies such as the Wild Salmon Policy (WSP), and establish a formal framework for setting escapement targets. In addition, there were new and emerging technologies and methodologies for analyzing the historical data and projecting consequences of different strategies. The Fraser River Sockeye Spawning Initiative (FRSSI) was the result.⁴¹⁰

FRSSI: development and implementation

In 2002, DFO initiated the change in escapement planning to FRSSI, and four years later, it was implemented. FRSSI is both a computer model and a consultative process.

In terms of the model component, in 2004, DFO scientists Mr. Cass and Mr. Folkes, together with Gottfried Pestal (who was then at Simon Fraser University), produced a CSAS research document in which they developed "a quantitative modeling tool for assessing harvest rules for Fraser River sockeye salmon given conservation needs and other management objectives."⁴¹¹ In the proposed model, the authors acknowledged its similarity to the previous escapement planning principles:

- Target exploitation rates (and hence catch and escapement) vary with estimated run size.
- Constraints on harvest rules may include a minimum run size with zero harvest, a maximum exploitation rate for aggregates to protect small co-migrating stocks with lower productivity, and possibly an escapement ceiling for individual stocks.⁴¹²

However, the proposed FRSSI model was modified "to address the challenges and concerns identified while implementing the rebuilding plan":

- Develop escapement plans based on optimal (target) exploitation rates rather than fixing target escapement derived from highly uncertain estimates of optimal escapement.
- Don't prescribe a strictly increasing rebuilding trajectory (i.e. remove the constraint of not going below brood year escapement) but rather, balance the trade-off between catch and escapement in an objectives-based approach that considers the preference of stakeholders.⁴¹³

Mr. Cass said that, subsequent to the publication of the research document, DFO held a series of six workshops with stakeholders in order “to identify the range of preferences that would become the objectives” and to assist DFO to determine the appropriate model, given the uncertainty in the stocks.⁴¹⁴ In 2006, DFO also hosted and published the proceedings of a workshop on cyclic dominance.⁴¹⁵ Mr. Cass said that the cyclic dominance workshop resulted in “major changes” to the FRSSI model set out in the 2004 paper (which had yet to be implemented) – namely, that the modelling had to account for cyclic dominance and that a fixed exploitation rate was necessary in some circumstances. He explained:

[T]he fundamental change was an acceptance that probably the best way to model the dynamics of Fraser sockeye was to include this so-called Larkin model which essentially is a Ricker model, but with some added terms to account for the importance of previous spawning escapements on determining the survival of a brood year in the sense that there was a [delayed] density impact ... depending on the size of the spawn, numbers of spawners, and on the degree of interaction between the spawners. So essentially it was a way to account for the cycles in terms of how these particular year classes interacted to result in differences in mortality associated and driving cycles.

[T]he other ... fundamental change was ... that the more appropriate way to manage according to a rule was to have a fixed exploitation rate applied across a large run size range with some contingency for ramp-

ing down on that harvest rate at low run size abundances.⁴¹⁶

As stated in the FRSSI 2009 Model Overview:

Escapement strategies in the FRSSI model are defined as a Total Allowable Mortality Rule (TAM rule) that specifies the total allowable mortality rate at different run sizes. The escapement strategies are designed around three fundamental considerations:

- No fishing at very low run size, except for test fishing. The No-Fishing point is intended to keep component Conservation Units out of the red zone ... with a specified risk tolerance.
- Fixed escapement at low run sizes to protect the stocks and reduce process-related challenges at this critical stage (e.g. uncertain run size).
- Fixed total allowable mortality rate at larger run sizes to ensure robustness against uncertainty in population dynamics (e.g. capacity estimate) and in-season information.

This approach is equivalent to specifying a target escapement that changes with run size. For example, if the total allowable mortality for a run size of 1 million is 60%, then the corresponding target escapement is 400,000 and the available exploitation rate is 60% minus a management adjustment which accounts for the difference between fish counted at Mission and fish counted on the spawning grounds.⁴¹⁷

DFO implemented FRSSI in 2006, and an example of the interaction between the total allowable mortality (TAM) and the considerations discussed above is set out in Figure 1.5.11.

Mr. Grout explained the graphs set out in Figure 1.5.11 as follows:

[T]he top figure here, which is the total allowable mortality[,] gives you a sense of the shape of the harvest rule, which you're going to see in the subsequent figure [see Figure 1.5.12]. There's two key reference points that describe the shape of the curve. One is the no-fishing point, which is at about 0.4 million in this curve, and

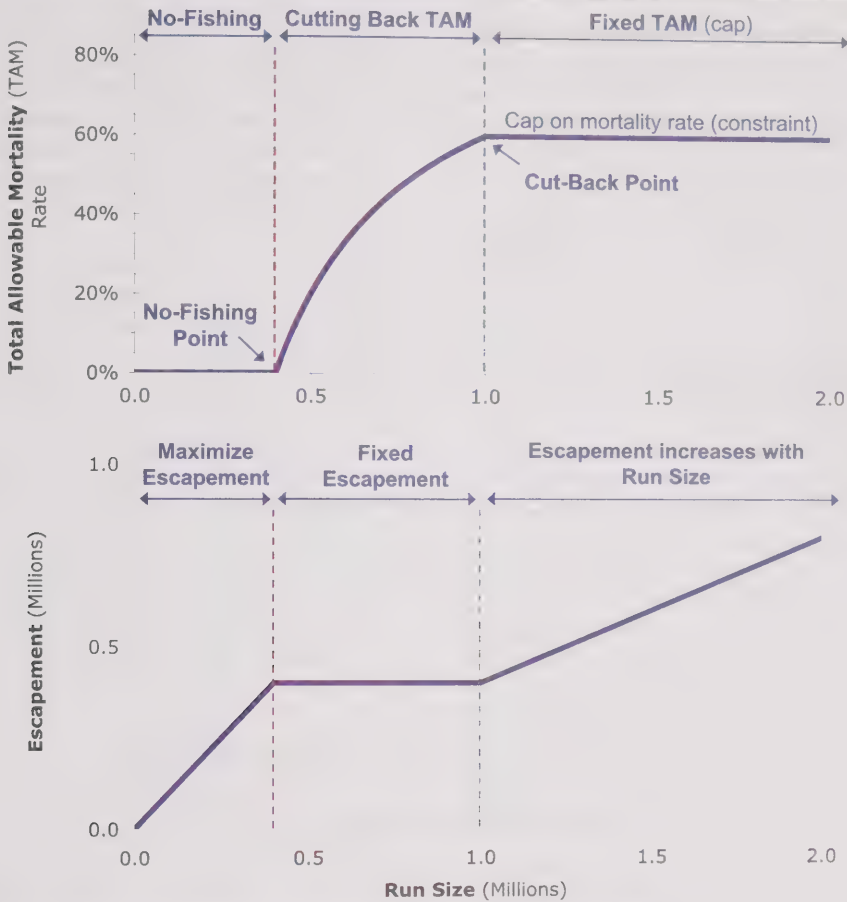


Figure 1.5.11 Illustration of TAM rule and corresponding escapement strategy

Source: Reproduced from Exhibit 322, p. 9.

to that point, we're trying to maximize escapement. There might be some minimal harvest for food, social and ceremonial harvests, potentially ceremonial fisheries and test fisheries, but up until about 0.4 million, we're trying to maximize the escapement, which is what you see in the lower figure. So the top figure shows you the total mortality you can apply to the run. The lower figure shows you the escapement that's going to result from that.

For the next sort of middle stanza between the no-fishing point and the cutback point, we enter in a period from 0.4 million to 1 million where we're applying a fixed escapement. So over this run size return, we're allowing 400,000 spawners to go back to return

to spawn, and so you see the total allowable mortality increasing over that point. And then the final stanza of abundance, we have above one million, we've capped the total allowable mortality at 60 percent, and it splits the benefits, essentially 60/40 between catch and escapement. So that's the context of the harvest rules.⁴¹⁸

Mr. Cass said that, to establish a fixed exploitation rate, DFO determined it was necessary to set a ceiling on TAM - the total number of fish that are caught in the fisheries or that die en route to the spawning grounds.⁴¹⁹ Because the fisheries are managed by the run-timing groups, any run-timing group may contain a mix of weaker and stronger

Conservation Units. Therefore, DFO recognized a need for precaution in setting the maximum mortality rate. DFO set the TAM ceiling at 60 percent, which Mr. Cass acknowledged to be a policy choice by DFO:

Once we agreed that the control rule would be a fixed exploitation rate across a range of run sizes, then the question is what would you set the total allowable mortality rule at? And so it's at that stage where we, throughout the workshop environment, came to a value of 60 percent and it's important, I think to note that that's not based on an outcome from modelling the population dynamics for the stocks that we included in the model. It was designed to reduce the probability of doing harm, if you like, to stocks that had a lower productivity that weren't reflected in the model, so it was a way to guard against populations, reduce the harvest rate from what might be the optimal to guard against over fishing small stocks in mixed stock fisheries. It was also designed to mitigate, if you like, or reduce the impact of uncertainty in in-season management, so uncertainty in run sizes that higher exploitation rates could have the undesirable impact of removing too many fish if the run size was estimated to be lower than it actually was. And it also guarded against what's been called sort of implementational error. You can't precisely implement a fishery with an exact harvest rate, so there's some uncertainty about what exactly the harvest rate you can achieve, given your target.

And so those three things resulted in a policy choice, if you like, to have a 60 percent cap, which is what is currently in the plan.⁴²⁰

The FRSSI model simulates a group of stocks, applies different escapement strategies to each run-timing group over 48 years into the future, and tracks the performance of these escapement strategies against certain defined performance

measures.⁴²¹ In 2008, DFO published a summary of the development of FRSSI to that date.⁴²² In describing the simulation model developed through the FRSSI process, Mr. Cass acknowledged that both technical and policy choices are made in determining escapement strategies and harvest management:

Technical considerations include the dynamics of Fraser sockeye stocks, and how the stocks are expected to respond to different escapement strategies. Policy choices focus on trade-offs between different management objectives, such as:

- Policy Choice 1: Trade-off between harvest benefits versus providing protection to individual stocks.
- Policy Choice 2: Trade-off between short-term and long-term benefits.
- Policy Choice 3: Trade-off between stability in catch and maximizing opportunity.⁴²³

FRSSI in practice

For DFO management, the FRSSI model allows DFO to evaluate the effect of different escapement strategies for any of the modelled stocks against certain management objectives or performance measures. There are three general classes of performance measures or performance indicators: yield, variability, and conservation.⁴²⁴ The key performance measures are the probability of a population not meeting an escapement benchmark (avoiding low spawning abundance);* the probability of the realizable harvest being less than 1 million fish (described as a socio-economic indicator);⁴²⁵ and the probability of a four-year average of spawners being lower than a particular benchmark for abundance.⁴²⁶

In setting the escapement targets under FRSSI, options for escapement strategies for each

* A note about benchmarks in the FRSSI context: "Benchmarks are specific levels of a performance measure that are meaningful to a broader audience ... While FRSSI was being developed, implementation of the Wild Salmon Policy was also underway. Definition of benchmarks is an important aspect of the Wild Salmon Policy. Those WSP benchmarks for Fraser Sockeye are not available yet" (Exhibit 400, pp. 18–19); "Benchmarks used in the FRSSI process are called 'interim benchmarks' to distinguish them from the CU benchmarks contemplated by the Wild Salmon Policy. The intention is that the FRSSI benchmarks will be reviewed for consistency once the Wild Salmon Policy benchmarks have been established" (PPR 5, p. 39; see also Al Cass, Transcript, February 7, 2011, p. 26; Jeff Grout, Transcript, January 17, 2011, p. 35; and the discussion of benchmarks in Chapter 10, Wild Salmon Policy).

run-timing group based on performance measures are selected (typically four options) and presented to stakeholders and First Nations in the first draft of the IFMP for consideration and debate during the IHPC process; they are also distributed outside the IHPC process during sector and First Nations meetings.⁴²⁷ The suggested escapement targets are

set out in a memo prepared by DFO's "technical working group."⁴²⁸ For each run-timing group (Early Stuart, Early Summer, Summer, and Late-run), two graphs are provided – the top showing "performance indicators"⁴²⁹ and the bottom showing "escapement strategies" with four separate options. Figure 1.5.12 illustrates the Early Stuart run.

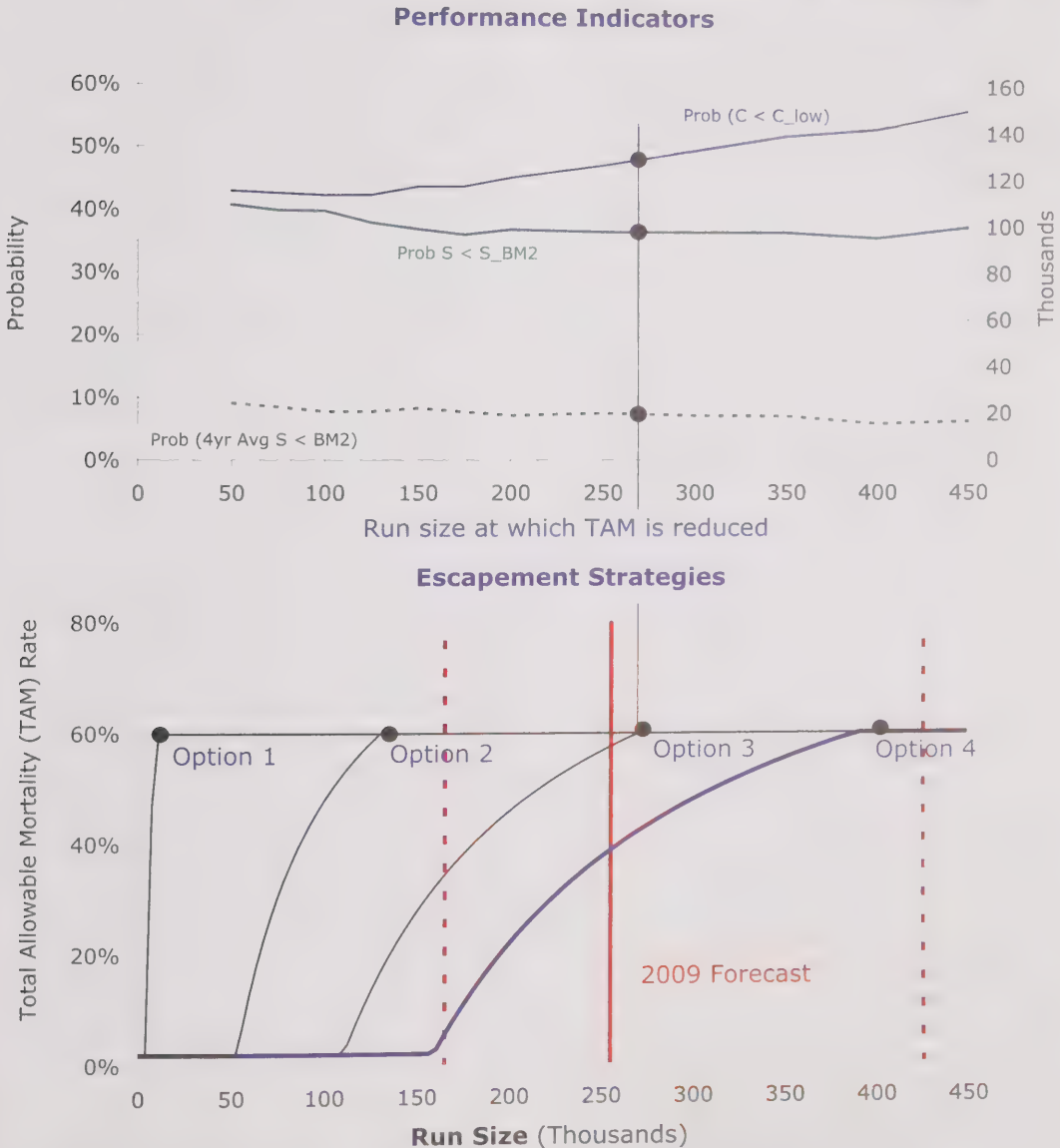


Figure 1.5.12 Sample simulation results and options for the Early Stuart run

Source: Reproduced from Exhibit 322, p. 15.

Mr. Grout explained the two graphs as follows:

[I]f you just focus on the lower figure for now, which is the total allowable mortality rate versus the run size, it's not showing the escapement in this figure. It's showing you the amount of mortality you can apply and it's got four different curves listed there from option 1 to option 4. And option 1 is a curve where you would start fishing sooner and you'd place a higher importance on avoiding low catch, for example. Option 4 would be you'd wait longer to fish. You can see the no-fishing reference point is shifted over to over 150,000, and then you would gradually build harvest. So you'd be much more interested in avoiding low spawners in that case.

In terms of the performance indicators, at the top, the axis on the top figure is the run size which the total allowable mortality is reduced. So it's ... essentially the cutback point. So you can read off there what the performance of the different options would be. So Option 1, for example, has a cutback point that's quite low here.

[G]oing back to the lower figure, the vertical dotted lines and the solid vertical bars show you the probability range on the forecast, with the solid bar being the midpoint of the forecast. The lower dotted line, the p75 [%] probability and then the ... p90 [%] on the other side.

What you can then do is look at the figure above at the run size at which the total allowable mortality is reduced. So each of figures – options 1, 2, 3 and 4 has a different level and it shows you the probability of avoiding low catch, or probability of catch less than the low catch benchmark.⁴³⁰

Mr. Cass explained that FRSSI allows DFO to model stock-specific escapement strategies, rather than as an aggregate, so that the overlapping runs are accounted for (at least for the 19 stocks with data).⁴³¹

The 2008 and 2009 escapement memos state that one of the stocks in the Late-run group exhibited strong cyclic dominance and contributed most of the abundance (Late Shuswap). Run sizes for this group swing from 2 million in dominant years to 500,000 in off-cycle years. In off-cycle years, the

expected return is well below the “no fishing point” generated by the FRSSI model. Because of that, in off-cycle years such as 2009, DFO used a “fixed floor” exploitation rate of 20 percent instead of a FRSSI-generated harvest rule.⁴³² The run size was so low that it would not justify generating a harvest rule that increased the exploitation rate as the run size increased. Mr. Grout said that the 20 percent exploitation rate was developed to allow some access to the more abundant Summer-run group, which overlaps with the Late-run group, and to be consistent with the 20 percent harvest rate for Cultus Lake.⁴³³ For 2010, which was a dominant year for the Late Shuswap, pre-season planning identified a 20 percent exploitation rate for the Late-run group, although this rate was increased in-season.

According to Mr. Cass, the FRSSI model itself does not allocate harvest – it determines TAM rules, and DFO managers then allocate harvest (or mortality) among the commercial, recreational, and Aboriginal fisheries, as well as accounting for mortality through natural causes.⁴³⁴

Changes to the FRSSI model

In 2010, Mr. Cass, Mr. Pestal, and Ann-Marie Huang, a DFO scientist, reviewed the methodology of the FRSSI model and published their response in a CSAP working paper.⁴³⁵ The stated objective of their paper was to review methods to evaluate the performance of alternative escapement strategies for Fraser River sockeye populations and to explore the sensitivity of different escapement strategies to key sources of uncertainty.⁴³⁶ The authors acknowledged that the FRSSI model focuses on long-term strategies (it assumes that “one strategy is going to be adopted and applied for 48 years, which is not likely in practice”) and doesn't address “all of the operational complexities of in-season management.”⁴³⁷ The authors also recognized the challenge of incorporating DFO's Wild Salmon Policy with the FRSSI model:

The modelling framework developed for the [FRSSI] is consistent with the biological principles outlined in the WSP. For example, the stocks included in the simulation model closely match up with lake-based conser-

vation units ... and escapement strategies are evaluated based on the performance of individual stocks, not management groups. Unfortunately, there are only 19 stocks with sufficient escapement and return data to allow incorporation into the simulation model. This presents an ongoing challenge for the operational aspects of the Wild Salmon Policy, and a coast-wide approach is under development for incorporating CUs with insufficient data into the planning and implementation of fisheries ... In addition, there is a paper in progress that is scheduled to be reviewed in the fall of 2010 [Exhibit 1915] on Fraser sockeye benchmarks. Once these are available, we will reassess the performance of the stocks against the formal WSP benchmarks.⁴³⁸

In the 2010 FRSSI paper, the authors set out the following priority areas for ongoing work in preparation for workshops with stakeholders scheduled for 2010–11:

- Review the freshwater ecology of each stock to identify plausible hypotheses for the structure of best fit models (i.e. why are some lag-terms significant?)
- Explore risk management approach to uncertainty in SR [stock / recruitment] models and assess the risk of being wrong in assumptions about delayed-density effects (e.g. what if we manage a Ricker-type stock based on Larkin model assumptions).
- Explore implications of alternative SR models (i.e. number of lag terms) for setting benchmarks under the *Wild Salmon Policy*.
- Investigate differences between this model and the previous version.
- Explore alternative approaches for random variation in forward simulations.
- Enhance the communication of the model scenarios and implications (e.g. Larkin fits), and facilitate real-time use during workshop deliberations.
- Finalizing the dataset(s) for Fraser sockeye. There are several on-going processes dealing with this, including: a) Cultus dataset from the Cultus Conservation

Team, b) data checking for the non-Cultus populations by the Pacific Salmon Commission Staff, and c) checking historic escapement estimates for proper use of zeroes versus NAs by Fraser Stock Assessment staff.⁴³⁹

Mr. Ryall testified that DFO intended to review the TAM rules, among other things, in 2011 after four years of FRSSI implementation (2007–10).⁴⁴⁰ However, at the time of the evidentiary hearings, DFO had not undertaken the actions identified above as priority areas.⁴⁴¹

FRSSI criticisms

In general, witnesses agreed that escapement targets are useful and necessary and that the FRSSI model and process is essentially a good start and an improvement to DFO's 1987 rebuilding strategy. However, Rob Morley, vice-president of the Canadian Fishing Company, Mr. Cass, and Mr. Wilson noted that DFO faces difficulty in explaining FRSSI to stakeholders because of the highly technical nature of the model and how results are generated.⁴⁴²

Mr. Morley and Mr. Wilson also criticized the FRSSI model because, although it models 90–95 percent of the stocks, it cannot model those stocks for which it does not have information. The blanket 60 percent total allowable mortality ceiling could be detrimental to these stocks.⁴⁴³

Mr. Morley, Mr. Cass, and Mr. Wilson also said that, because the Fraser River sockeye salmon fishery is a mixed-stock fishery, that factor may create problems in setting TAM across the fishery at a 60 percent ceiling (the 60 percent ceiling is a maximum, and TAM is not always that high; for some witnesses, the 60 percent ceiling is too low, while for others, too high).⁴⁴⁴ Related to the TAM ceiling is the issue of large spawner abundances, sometimes called “over-escapement”: criticism was levelled that the FRSSI model sets escapement targets that allow too many fish on the spawning grounds, thereby risking a decline in the population (see the section on over-escapement below).

Another criticism levelled at DFO and the use of the FRSSI model is that DFO does not consider economic trade-offs that are required to be made

in setting total allowable mortality / escapement.⁴⁴⁵ Mr. Morley urged that, when presenting the four optional escapement targets in a given year for a given run, DFO should conduct an economic evaluation of the harvest rates before choosing a model. That evaluation would include:

What are the values to incomes to First Nations fishers in Johnstone Strait, to gillnetters in the lower river, to First Nations economic opportunity fisheries in the river[,] to First Nations' very important FSC fisheries all the way up the river?

That evaluation is not done in the context of analyzing these escapement goals. And once we set these rules, currently, they have been extremely inflexible in-season.⁴⁴⁶

However, DFO witness Mr. Ryall defended the FRSSI model, arguing that FRSSI harvest rules do factor in social and economic considerations, although not perfectly, and that conservation considerations are also factored in through the use of performance measures.⁴⁴⁷ Other criticism of the FRSSI model and process focused on the lack of consideration of the effect of habitat on productivity and the resulting escapement targets.⁴⁴⁸

Related issue: impact of large escapements, or “over-escapement”

Issues were raised in the Inquiry concerning the impact on stocks from over-escapement. The phenomenon has been defined as allowing escapement surplus to those fish needed to produce the maximum average yield (the maximization of the average harvest on a particular line in cyclic dominant stocks).⁴⁴⁹ Mr. Wilson described it as “under-fishing” – not harvesting all the fish that have been identified as surplus to the escapement goal.⁴⁵⁰ Over-escapement has also been defined as large escapements that, through delayed density-dependent effects,* cause a significant decrease in productivity in future recruits.⁴⁵¹ Over-escapement

is also discussed in Volume 2, chapters 2, Public submissions, 4, Decline-related evidence, and 5, Findings, of this Report.

The witnesses who were critical of over-escapement asserted that allowing large escapements results in delayed density-dependent effects in cyclically dominant stocks. Dr. Walters expressed the concern that over-escapement may ultimately create a strong dominant pattern synchronized across all or many cyclic stocks and creating one enormous dominant year, followed by three very small years, thereby seriously compromising the stability of the fishery.⁴⁵² All witnesses who testified on this issue agreed that, judging by the weight of evidence, there is a low risk of stock collapse, if any risk at all, arising from large escapements.⁴⁵³

Large escapements may have beneficial ecosystem effects, such as streamside and aquatic vegetation. In addition, they may provide benefits to other species (e.g., bears or birds), providing nutrients to the lake and the surrounding system (ecosystem services).⁴⁵⁴ However, there is need for further scientific research on the benefits to the ecosystem of large escapements of sockeye.⁴⁵⁵

Findings

The Pacific Salmon Treaty stipulates that the Department of Fisheries and Oceans (DFO) must set escapement targets, and I am satisfied from the evidence that the Fraser River Sockeye Spawning Initiative (FRSSI) process and the model developed for that purpose are serving a valuable function. I am also satisfied that FRSSI is an improvement over DFO's earlier rebuilding strategy.

I encourage DFO to follow through with its stated intention to review the FRSSI model and address the criticisms of it, including whether total allowable mortality (TAM) as a function of run size should have a maximum 60 percent cap. Although I note that FRSSI is a very technical process, it is in DFO's interests to be more explicit about both the values it is considering in setting escapement targets under FRSSI and the way DFO weighs these values. I also urge DFO to be explicit in how

* Delayed density dependence is a mechanism and description of an assumed biological link between generations, whereas over-escapement is a term for the number of spawners relative to some reference point. Randall Peterman, Transcript, April 21, 2011, pp. 69–70.

it considers habitat and large escapement issues (where applicable) in its escapement planning.

I note that FRSSI is not an implementation of the Wild Salmon Policy. However, the criticisms of FRSSI and the trade-offs associated with setting escapement targets should be a component of the work DFO performs under Strategy 4 of the WSP, as discussed in Chapter 10, Wild Salmon Policy.

I discuss these findings and any related recommendations in Volume 3 of this Report.

■ Integrated Fisheries Management Plan

As part of its pre-season planning, DFO produces an Integrated Fisheries Management Plan for salmon, which encompasses all of the fisheries.⁴⁵⁶ The Pacific Region IFMP Salmon Southern B.C. addresses the management of Fraser River sockeye.⁴⁵⁷

DFO's preparation of the IFMP runs parallel to the Fraser River Panel's preparation of the fishing plans for the commercial sockeye fishery in Panel Area waters.

Introduction of the IFMP

Before it introduced the IFMP in 1999, DFO published yearly fishery management plans that provided the commercial fishing sector with the rules of a particular fishery. These annual plans were divided by fishing gear into two types: net fishing plans (seine and gillnetters) and troll fishing plans. The fishery management plans set out the pre-season forecasts, estimated TAC, and anticipated fishing opportunities for each DFO fishing area.

DFO formally introduced the IFMP in 1999 as part of its national co-management initiative, set out in its three-volume document *Framework and Guidelines for Implementing the Co-Management Approach* (Vol. 1: Context, Concept and Principles; Vol. 2: Integrated Fisheries Management Plans; and Vol. 3: Guidelines for Joint Project Agreements).⁴⁵⁸ These documents set out a standard framework for fisheries co-management involving two steps: the IFMP document, followed by a legally binding, voluntary Joint Project Agreement, which spells out the

roles and responsibilities of DFO and resource users with respect to specific co-management projects.

According to DFO, "the IFMP is both a process and a document. Its primary goal is to provide a planning framework for the conservation and sustainable use of fisheries resources and the process by which a given fishery will be managed for a period of time."⁴⁵⁹ The IFMP document "describes the management of Pacific salmon fisheries in southern B.C. and the factors that influence decision-making ... [It] incorporates the results of consultations and input from the [IHPC], First Nations, recreational and commercial advisors and the Marine Conservation Caucus."⁴⁶⁰

The IFMP as a process

As a process, the IFMP is intended to integrate the expertise and activities of various DFO program activities in fisheries management planning (e.g., Fisheries Management; Science; Conservation and Protection; Aboriginal Policy and Governance; Oceans, Habitat and Enhancement; Policy and Economics; and Aquaculture). The IFMP process is also intended to provide an opportunity for First Nations and stakeholders to provide their views on the management of the fishery, and, as stated in the IFMP, the IHPC is "recognized to be the primary source of stakeholder input into" the salmon IFMP, although input to the IFMP is also received through other avenues.⁴⁶¹ DFO's senior management repeatedly told me that the IFMP process is consultative.⁴⁶²

DFO Pacific Region's Fisheries and Aquaculture Management Branch manages the IFMP process, which is cyclic, and adheres to the following rough schedule:

- The IFMP development process is triggered by the annual post-season review of the fishery. This review helps to determine the effectiveness of the previous year's management measures and to identify areas for improvement.
- Immediately on completion of the post-season review, the chair of the salmon IFMP process invites relevant DFO sectors to designate a representative to an IFMP Development Committee. The position of chair rotates among different resource management area

chiefs of the South Coast, Lower Fraser, and BC Interior areas.

- The IFMP Development Committee discusses the results of the post-season review, assigns sectoral tasks required for the development of the IFMP, and sets a timeline for the collection and consolidation of information. The chair tracks progress and consolidates the information into a draft document.
- The chair invites the directors of the different sectors represented on the Development Committee to meet and discuss the draft IFMP. DFO incorporates their feedback in a revised draft IFMP, including the internal agreement in principle on the main elements, issues, and objectives.
- DFO consults with external groups once it has produced a revised version of the IFMP. Where DFO has determined that there is a legal duty to consult with Aboriginal groups, DFO's resource management staff are supposed to ensure that the existing process for consultations or any new process designed for this purpose meets the requirements outlined in the *Interim Guidelines for Federal Officials to Fulfill the Legal Duty to Consult*, February 2008.⁴⁶³
- The chair presents the draft IFMP at the March and May IHPC meetings, and DFO encourages IHPC participants to discuss the content of the document, provide additional information, and suggest needed changes. A structured agenda and appropriate facilitation techniques are used to guide the meeting, and a record of the discussions and decisions is kept. In co-operation with participants, DFO incorporates feedback in a revised draft IFMP.
- The chair invites the directors of the different sectors represented on the Development Committee to meet and discuss the post-consultation draft IFMP. The draft is presented by the chair. DFO incorporates this feedback in a revised draft IFMP, and this document becomes the final draft IFMP.
- The final draft IFMP and the associated briefing note are delivered to the minister for approval. To allow time for review of the IFMP, and for the preparation of licence conditions before the

start of fishing activities, the IFMP is supposed to be submitted for approval as far in advance of the opening of the fishery as possible.*

- DFO releases the final IFMP to the public on the DFO national and regional websites; DFO states that, if possible, it should be released a minimum of one month before the opening of the fishery.⁴⁶⁴

While the chair of the salmon IFMP process is responsible for making sure that the IFMP is completed every year, the regional resource manager for salmon is tasked with coordinating the staff in all branches across the South Coast, Lower Fraser, and BC Interior areas who contribute to the salmon IFMP.

Some First Nations are of the opinion that DFO does not adequately engage with them in the IFMP process.⁴⁶⁵ According to Mr. Shepert, chair of the Upper Fraser Fisheries Conservation Alliance and member of the Fraser River Panel, the present system⁴⁶⁶ of sending recommendations to DFO is unsatisfactory:

[W]e get what was accepted and what wasn't and usually some sort of a rationale, although we don't understand who made the decision or why the decision was made ... there's definite room for improvement ... starting with the technical agenda, working through those technical agendas at the watershed, and then the sub-regions from there would greatly improve understanding of how decisions are made.⁴⁶⁷

Mr. Rosenberger disagreed, testifying that DFO had made a number of changes in the development of the IFMP (and at the IHPC) regarding First Nations representation and communication.⁴⁶⁸

In its final written submissions, the First Nations Coalition submitted that DFO should engage more with First Nations, at a Tier 2 level, regarding the IFMP:

[T]he fisheries management decisions in the IFMP have potential impacts on the exercise of Aboriginal and treaty rights, and therefore require consultation and, where appropriate,

* The IFMP is usually approved in late June or early July, after the fishing season has commenced. Jeff Grout, Transcript, January 17, 2011, p. 6; Barry Rosenberger, Transcript, January 17, 2011, p. 68; see also Exhibit 327, which is date stamped by the minister's office June 25, 2009.

accommodation. The FNC submits that given the nature of the decisions made in the IFMP, and the fact that the IFMP guides the decision making process that occurs in-season at the FRP, it is critical that First Nations have an opportunity, on a Tier [2] level, to discuss these issues with DFO.⁴⁶⁹

Mr. Young of the Marine Conservation Caucus criticized the lack of transparency in DFO's decision-making process, saying that recommendations are made through the IHPC but that DFO neither incorporates them into the IFMP nor explains why the recommendation is not accepted.⁴⁷⁰ Mr. Grout acknowledged that, after the May IHPC meeting reviewing the draft IFMP, although DFO may receive further comments on the IFMP from IHPC participants, it is a challenge to incorporate them into the IFMP for the minister's approval.⁴⁷¹

The IFMP as a document

DFO developed the current format of the salmon IFMP over two years from 2000 to 2002. It follows a standard template. The 2010–11 salmon IFMP includes the following information:

- management changes for 2010–11;
- introduction;
- general context (which contains, among other sections, 3.2 the policy framework for the management of Pacific salmon fisheries, 3.3 conservation statement, 3.6 First Nations and Canada's fisheries framework, 3.7 scientific support, and 3.8 Pacific Salmon Treaty);
- fishery management objectives (including the sections 4.1 stocks of concern, 4.2 First Nations, 4.3 recreational and commercial, 4.4 international, 4.5 domestic allocation, 4.6 compliance management, and 4.7 enhancement objectives);
- decision guidelines and specific management measures (section 5.5 sets out Fraser River sockeye decision guidelines);
- the Southern BC / Fraser River First Nations fishing plan (FSC fisheries only);
- the Southern BC / Fraser River Recreational Fishing plan;

- the Southern BC / Fraser River Commercial Fishing plan; and
- the post-season review of the 2009 fishery.⁴⁷²

IFMP: ministerial discretion to approve

Ultimately, the minister approves the IFMP. As preparation for the approval, the minister is given a briefing note with recommendations prepared by DFO Pacific Region's Salmon Team.⁴⁷³ This briefing note is vetted first by the regional director of Fisheries and Agriculture Management, and then by the regional director general of the Pacific Region. It is further vetted in Ottawa by the assistant deputy minister of FAM and the director of Fisheries Resource Management Pacific / Central and Arctic at national headquarters.⁴⁷⁴ The IFMP may be altered at any time by the minister under the discretionary powers conferred by the *Fisheries Act*.

Mr. Grout told me that the salmon IFMP is approved at the ministerial level, whereas some IFMPs for other fisheries are not.⁴⁷⁵ The briefing note provided to the minister for approval of the 2009–10 IFMP and the minister's approval of the briefing note were tendered as exhibits.⁴⁷⁶ On the copy of the minister's approval of the briefing note, the words "need to ensure we maximize opportunities for commercial fisheries" were handwritten beside the minister's signature, and the note was date stamped June 25, 2009.⁴⁷⁷ However, Mr. Rosenberger testified that the minister's comment on the final IFMP did not have any impact on the in-season management of the fishery that year.⁴⁷⁸

IFMP renewal

IFMP renewal was initiated in 2007–8 to make the IFMP process consistent with the Sustainable Fisheries Framework (discussed in Chapter 4, DFO overview).⁴⁷⁹ DFO produced the Fisheries Sustainability Checklist,⁴⁸⁰ which Ms. Farlinger, regional director general, Pacific Region, explained "sets out how have we [DFO] used the precautionary approach, how have we addressed ecosystem issues, how have we addressed basic stock assessment issues."⁴⁸¹

In April 2008, DFO released a draft (first revision) of a policy document, “A Framework for Socio-Economic Analysis to Inform Integrated Fisheries Management Planning and Fish Harvest Decisions,”⁴⁸² which presents guidelines and principles for conducting a socio-economic analysis to inform the IFMP process and the annual harvest decisions.⁴⁸³ The compilation of this framework was done in concert with the development of a new template and guidelines for all IFMPs (not just the salmon IFMP).⁴⁸⁴ According to this document, IFMPs should include an economic profile and assessment of the current economic health / viability of the fishery. An economic analysis of management objectives and measures will be done when the minister and/or senior managers request resource management staff to look at particular options.⁴⁸⁵ However, there was no evidence that DFO had acted on this document, and there were no changes to the IFMP.⁴⁸⁶

DFO issued a new IFMP template in 2010,⁴⁸⁷ and DFO’s intention is to have a standardized format for IFMPs for all species. The new IFMP templates are a national initiative, and DFO intends eventually to make IFMPs into multi-year plans that, in the words of Ms. Farlinger, will be “more consistent [with each other so] that we [DFO] can explain that sustainability checklist and how well or not we are doing against that to parliament and Canadians.”⁴⁸⁸

Findings

I commend the Department of Fisheries and Oceans (DFO) for its efforts to improve communication about the Integrated Fisheries Management Plan (IFMP) to those it affects and for its efforts to modernize the IFMP. I am hopeful that DFO can implement its stated goal of including an economic profile and assessment of the current economic health and viability of the fishery in the IFMP and in making the IFMP a multi-year document.

I am satisfied that the process around the IFMP is sound. However, First Nations and stakeholders who participate in the Integrated Harvest Planning Committee (IHPC) are frustrated when the recommendations they make

during that process, recommendations that are incorporated into the draft IFMP, do not wind up in the final version of the IFMP that is approved by the minister, and they are given no reason for these changes. The minister has the discretion to make such changes, but those who have invested so much time and energy in the IHPC process deserve to understand the reasoning behind the changes.

I discuss these findings and any related recommendations in Volume 3 of this Report.

■ Fraser River Panel pre-season management

The Terms of Reference of this Inquiry do not expressly require me to consider the management of the commercial harvest of Fraser River sockeye salmon by the Pacific Salmon Commission (and its Fraser River Panel) under the terms of the Pacific Salmon Treaty. However, given the historical and extensive involvement of the Pacific Salmon Commission with the DFO in the management of the Fraser River sockeye fishery, it is important to understand how the two entities work together and divide the responsibilities.

The Fraser River Panel

Under the Pacific Salmon Treaty, the Fraser River Panel manages the commercial harvest of Fraser River sockeye (and pink) salmon in the Fraser Panel Area; it is responsible for developing pre-season fishing plans, in-season decision rules, and in-season harvest regulations of Fraser River sockeye in its waters.⁴⁸⁹ Although the Fraser River Panel does not regulate commercial fisheries in waters outside the Panel Area, DFO will generally ask the Fraser River Panel for comments with respect to these fisheries. However, there is no equivalent process for the Fraser River Panel to comment on DFO’s proposed Aboriginal food, social, and ceremonial (FSC) fisheries, though DFO will provide information to the Fraser River Panel and the Pacific Salmon Commission on all its fisheries (including Aboriginal fisheries).⁴⁹⁰

Fraser River Panel pre-season planning and the Harvest Planning Model

Mr. Lapointe said that the Fraser River Panel begins its pre-season planning in February of each year and, before the start of the fishing season, generates a pre-season management plan for Fraser River Panel Area fisheries. In the pre-season period, the Fraser River Panel holds three meetings: at its first meeting of the year (typically in February), DFO provides the Fraser River Panel with its pre-season forecasts; the panel meets again in April and in June, during which refinement of the pre-season forecasts and additional information is provided by DFO for the panel's pre-season planning. Mr. Lapointe described this planning as a process to create "a number of scenarios for how a fishing season might take place given the available harvest." This process will produce an agreed pre-season fishing plan,* "which is basically a template for how the season might work out if the runs come back as expected."⁴⁹¹

The Fraser River Panel generates its pre-season plans through the use of a computer model – the

Harvest Planning Model. The panel's pre-season Harvest Planning Model relies on information from Canada and the United States to generate the pre-season fishing plans, including both countries' international catch allocation goals. Accordingly, DFO provides the Fraser River Panel with the following information: its escapement plan (the TAM rules and escapement targets obtained through the FRSSI model); its pre-season forecasts of run size, diversion rate, and timing; and its domestic catch allocation goals, which, for Canada, includes FSC, recreational, and commercial (broken out by licence area / gear type) objectives.⁴⁹² Canada will also provide its conservation objectives and identify management concerns for non-Fraser River sockeye stocks and other species, which must be taken into account in setting the fishery plan.

The Fraser River Panel / Pacific Salmon Commission created a document for this Inquiry explaining the panel's use of pre-season forecasts and pre-season planning in its management of the Fraser River sockeye fisheries. It is set out in Figure 1.5.13.

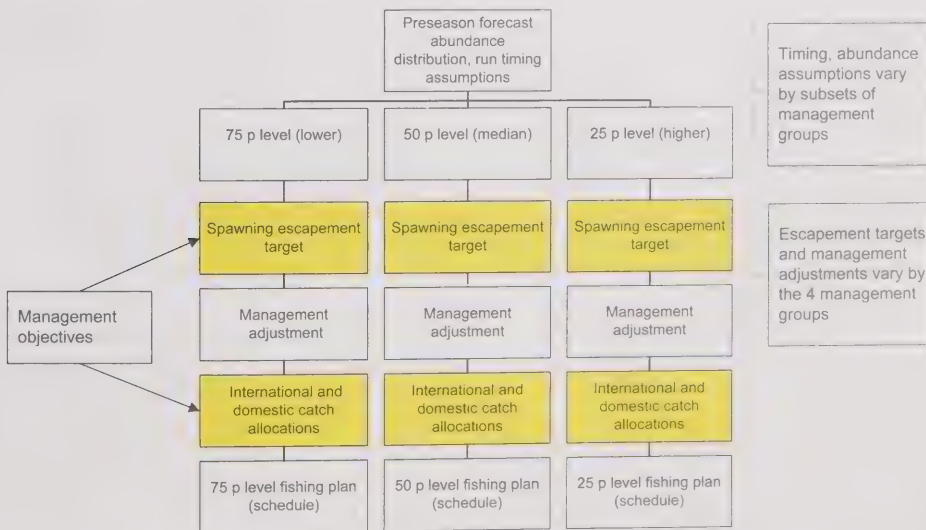


Figure 1.5.13 How pre-season forecasts are used in Fraser River sockeye management

Source: Reproduced from Exhibit 331, p. 1.

* As stated above in the overview of harvest management, the Pacific Salmon Commission – Fraser River Panel uses eight stock groupings in its management of the Fraser River sockeye fishery, which are based on the four run-timing groups as follows: the Early Stuart run is one stock group; the Early Summer run is broken down into three sub-groups – Early Miscellaneous, Scotch / Seymour, and North Thompson; the Summer run is divided into two sub-groups – Late Stuart / Stellako and Chilko / Quesnel; and the Late run is also broken into two sub-groups – Harrison and Late Shuswap / Weaver. See also PPR 5, p. 24; Mike Lapointe, Transcript, November 8, 2010, p. 27.

As stated in DFO's Record of Management Objectives, the objective of the Fraser River Panel's pre-season planning model is "to identify potential fishing opportunities while attempting to meet conservation, international, and domestic objectives."⁴⁹³ The computer model allows the panel to input specific fishery opening scenarios and observe the results. The resulting pre-season management plan identifies the approximate pattern of fishery openings required to achieve the Fraser River Panel objectives, given pre-season expectations, and serves as a reference point if the in-season data reflect the conditions with which the model was populated.⁴⁹⁴

A high degree of uncertainty is associated with the pre-season model because it uses uncertain predictive information about diversion rate, run size abundance (at different probability levels), return timing, and en route mortality. These pre-season fishing plans are "what if" scenarios based on the forecast information available pre-season. Mr. Lapointe described the uncertainty associated with the pre-season models:

[T]he intent of this exercise is to give [fisheries managers] some scoping of the potential scenarios, particularly on the fisheries planning side ... to conduct a what-if exercise in the middle of July or something is almost impossible.

So the degree to which we can do that kind of what-if probing in the calmness of April or June, is really important ... quite often we may be close on one of these scenarios ... that we did, and that really provides a valuable frame of reference when you're trying to make these fisheries decisions on the fly in the middle of summer while the information is changing every day.⁴⁹⁵

Mr. Lapointe provided an example of the output of the pre-season fishery planning model, which is presented in tables 1.5.6 and 1.5.7.

Before the fishing season begins, the Fraser River Panel approves two documents which are initialled by the Canadian and US chairs and contained in the *Record of Management Strategies: Principles and Constraints* (Principles and Constraints)⁴⁹⁶ and the *Guidelines for Pre-season Fraser Sockeye Fishing Plans to Address Late Run Concerns* (Guidelines).⁴⁹⁷ The Principles and

Constraints provide a "very broad statement"⁴⁹⁸ of the assumptions agreed to by Canada and the United States regarding the management of the fishery. They are based on the forecasted information and set out the TAC for each country (which I discuss below), as well as the regulations that will guide the fishery, including the anticipated date of the fishery openings if the forecasted abundance occurs. The 2009 document states:

Regulations

- i) If the abundance of Early Summer-run sockeye salmon is tracking at approximately the 50% probability level (739,000 fish) and the abundance of Summer-run sockeye salmon is tracking at approximately the 50% probability level (8,677,000 fish) and the runs arrive at or near normal dates, low impact fisheries in Panel Waters would be expected to commence the week of July 19-25. If the return abundances of Early Summer-run and Summer-run sockeye vary from the 50% probability level forecast, this could change the start dates, and duration of fisheries.
- ii) Fisheries directed at Fraser River pink salmon will be managed in accordance with the Late-run sockeye guidelines.
- iii) The Parties' conservation concerns for other species and stocks will be taken into account throughout the 2009 management season.⁴⁹⁹

The Guidelines set out the bilateral agreement on how the Fraser River Panel will address the behaviour of Late-run sockeye (based on historical observation) and the high level of mortality in these Late-run stocks, including assumptions and elements of the fishing plan to set the exploitation rates. The 2009 Guidelines state:

[T]he potential continuation of high in-river mortality [rates] experienced by several Late-run stocks in recent years continues to be a serious conservation concern and there is a special concern for critically depressed Cultus sockeye for which recovery efforts have been implemented by Canada to ensure this stock's long-term viability. A co-ordinated approach

Table 1.5.6 Model output reviewed with Fraser River Panel

Model run comparisons: June 16

Comments	DBE Early Summer Spawners to the Grounds (296,000)	DBE Summer Spawners to the Grounds (3,471,000)	DBE "Late- Lates" Spawners to the Grounds (458,000)	U.S. TAC	Canada TAC	U.S. Catch	Canada Catch	Total Catch	Early Summer Exploit Rate	Summer Exploit Rate	Cultus Exploit Rate	"Late- Lates" Exploit Rate	Potential Spawning Escapement "Late-Lates"
Harvest within constraints, 50% p 75% p ESu, 28% diversion, Bayes MA's June timings, Quota	302,107	4,939,848	53,087	889,100	4,899,400	551,473	3,651,079	4,202,552	43.3%	43.1%	16.8%	20.4%	456,146
→ Harvest within constraints, 50% p 75% p ESu, 28% diversion, Bayes MA's June timings, Quota	300,637	5,077,690	49,636	889,100	4,899,400	624,523	3,427,966	4,052,489	43.4%	41.4%	16.6%	20.1%	457,614
Canada & US harvest full TAC, 50% p 75% p ESu, 28% diversion, Bayes MA's June timings, Quota	239,380	3,592,626	46,258	889,100	4,899,400	888,703	4,863,104	5,751,807	51.8%	58.6%	31.9%	35.3%	370,450
US Harvests full share, Canada adjust, 50% p 75% p ESu, 28% diversion, Bayes MA's June timings, Quota	283,992	4,846,339	48,775	889,100	4,899,400	886,329	3,427,205	4,313,534	45.7%	44.1%	17.9%	21.3%	449,674
Harvest within constraints, 75% p all stocks, 28% diversion, Bayes MA's June timings, Quota	196,002	2,905,183	27,888	472,700	2,792,400	310,988	1,946,987	2,257,975	38.8%	40.8%	17.1%	20.4%	257,112
	(195,000)	(1,966,000)	(258,000)	< - goal at 75% p									

→ More detailed output for model run shown in second row - provided to each country's caucus (not typically discussed bilaterally)

Note: p is probability level.

Source: Reproduced from Exhibit 331, p. 8.

to management will be developed that reflects both Parties sharing the burden of conservation for Late-run sockeye.

Assumptions and Elements of the Plan

1. For fisheries planning purposes, we applied a precautionary approach and assumed that Late-run sockeye will continue their post-1995 early upstream migration behaviour. Given pre-season assumptions about marine timing and recent delay behaviour, the median upstream migration date for Late-run sockeye in 2009 is expected to occur during the 3rd week of August. Given this timing and based on the 50p forecast level of abundance (573,000 fish), the exploitation rate limit is 20%.⁵⁰⁰

Total allowable catch

The Pacific Salmon Treaty requires Canada to provide the Fraser River Panel with run size forecasts and escapement targets before each fishing season. Based on the forecast run sizes at different run size probability levels and corresponding spawning escapement targets, the Fraser River Panel will develop pre-season fishing plans and will then calculate the projected total allowable catch (TAC) for each country.⁵⁰¹ The panel will also calculate TAC allocations during its in-season management of the fishery.⁵⁰²

The international TAC formula for all Canadian and US Fraser River sockeye fisheries is set out in the treaty as follows:

$$TAC = \text{return} - \text{sockeye harvested in test fisheries} - \text{total escapement target} - MA - AFE^{503}$$

Table 1.5.7 Detailed model output provided to the caucuses in Canada and the United States

PACIFIC SALMON COMMISSION SOCKEYE FISHERY MODEL					2009
	50% p Level		Run:		
	Goal	%	Modeled	%	
Predicted Total Run:	10,488,000	100.00%	10,488,000	100.00%	
Commercial Catch:	5,358,500	51.09%	3,596,520	34.29%	
Gross Escapement:	5,593,900	53.34%	7,374,367	70.31%	
Test Fishing Catch:	64,700	0.62%	70,829	0.68%	
Non Commercial (Marine)	291,435	2.78%	291,435	2.78%	
U.S. Goal/Catch:	889,100	100.00%	624,523	100.00%	
Treaty Indian Catch:	601,921	67.70%	417,750	66.89%	
Non Indian Catch:	287,179	32.30%	206,773	33.11%	
Canadian Commercial Catch:	3,720,400	100.00%	2,126,829	100.00%	
Canadian Allocation/Catch:					
Area "B" Purse Seine	1,767,190	47.50%	1,008,232	47.41%	
Area "D" Gillnet	799,886	21.50%	474,631	22.32%	
Area "E" Gillnet	930,100	25.00%	516,158	24.27%	
Area "G" Troll	0	0.00%	0	0.00%	
Area "H" Troll	223,224	6.00%	127,808	6.01%	
Area "F" Troll	0		0		
Canadian Other Catch					
Recreational	170,000	NA	194,634	NA	
Fraser River Aboriginal	749,000	NA	845,168	NA	
Marine AFS	260,000	NA	261,335	NA	

Note: Harvest within constraints, 50% p 75% EStu, 28% diversion, Bayes MA's June timings, Quota.

Source: Reproduced from Exhibit 331, p. 9.

In the formula, MA means the management adjustment for each Fraser River sockeye run-timing group (management adjustments are discussed below), and AFE means the Aboriginal Fisheries Exemption (explained briefly below).⁵⁰⁴

United States total allowable catch

The following equation is used to calculate the United States TAC (USTAC):

$$USTAC = Treaty \% * (TAC)^{505}$$

In this formula, "Treaty %" is a fixed percentage of TAC allocated to United States fisheries (now set at 16.5 percent for each cycle year).⁵⁰⁶

Aboriginal Fisheries Exemption

The Aboriginal Fisheries Exemption (AFE) is a fixed amount of sockeye set aside for Canadian Aboriginal fisheries, as defined in the Pacific Salmon Treaty. In paragraph 3(d) of Annex IV, chapter 4, the Fraser River AFE amount is set up to 400,000 sockeye salmon annually for Canadian in-river and marine Aboriginal fisheries, of which up to 20 percent can be applied to the Early Stuart run-timing group. The portion of the total AFE assigned to the different run-timing groups is initially set using the historical average distribution of the Aboriginal harvests for the past three cycle years.⁵⁰⁷ The values set for each run-timing group may be adjusted where necessary to address conservation concerns or respond to major changes in run size for a specific run-timing group, or where the United States and Canada otherwise agree.⁵⁰⁸ The AFE is a treaty-defined amount and does not limit Canada's allocation of its TAC to First Nations FSC fisheries.

Canadian total allowable catch

The Canadian TAC (CTAC) is what remains when the USTAC is removed from the international TAC. The Canadian commercial TAC is what remains when the First Nations FSC catch and recreational catch is subtracted from the CTAC.

Post-season total allowable catch

Before 2005, post-season TAC was calculated using post-season estimates of run size, spawning

escapement, and test fishing. On February 17, 2005, the Fraser River Panel agreed on a revised Annex IV, chapter 4 of the treaty, which established a new method for calculating post-season TAC. The Fraser River Panel also decided to apply the new method for calculating post-season TAC retroactively for 2002 through 2004.

Since 2005, the calculation has used the estimates of run size, spawning escapement target, management adjustment, and test-fishing catch in effect when the Fraser River Panel relinquishes control of the last US Panel Area (usually late in September). The new method is therefore based on in-season data (estimated escapement) rather than post-season data (actual escapement) to calculate total sockeye available for sharing in each fishing season. This change affects the TAC and share calculations, and specifically the overages and underages relating to yearly TAC.

Although TAC is calculated as set out above, certain conservation and management constraints can limit harvesting opportunities. For that reason, TAC may not be reached in a given year.

Management adjustments

The Fraser River Panel determines the annual management adjustment to be added to the escapement goal. It is a way of estimating the number of fish that will be lost to en route mortality through high water temperature, high or low water flow, disease, predation, or illegal catches and of accounting for bias in the abundance estimates made at the hydroacoustic station at Mission, on the spawning grounds, and through catch monitoring.⁵⁰⁹ The management adjustment is made both pre-season (at the Fraser River Panel's June pre-season meeting) and in-season.

Mr. Lapointe told me that there have always been some uncertainties in estimates, resulting in differences between estimates at Mission and those on the spawning grounds. However, a serious problem was identified in the early 1990s in that there were significant discrepancies between fish counted at Mission and fish counted at the spawning grounds.⁵¹⁰ In 1997, in response to previous public reviews of the Fraser River sockeye fishery, the management adjustment

model based on environmental conditions was developed (known as environmental management adjustments).⁵¹¹ Environmental management adjustments have been adapted and refined for a number of years and are now known as “management adjustments.”⁵¹²

DFO’s Environmental Watch Program (EWatch) observes the migration biology of sockeye and the freshwater environmental factors that influence migration success. Specifically, the EWatch Program monitors and researches environmental conditions in the Fraser River; researches migration biology; and provides science advice on the impact of different freshwater factors primarily through modelling.⁵¹³

David Patterson, manager of the EWatch Program, testified about DFO’s modelling of management adjustments and offered the following definition of management adjustments: “A management adjustment is ... the [forgone] catch that is added to ensure that we [DFO] actually meet the spawning escapement targets.”⁵¹⁴

Management adjustments are a means to ensure that, in-season, enough fish arrive at Mission so that there will be sufficient fish on the spawning grounds to meet the escapement targets set by Canada for each of the management groups. Management adjustment models may use environmental data (e.g., temperature of the water and flow) and biological data (e.g., run timing) to predict the expected difference between the abundance estimates at Mission and the spawning ground escapement estimates.⁵¹⁵

The management goal is to make sure that the targeted number of spawners reaches the spawning grounds. DFO can estimate how many fish are expected to be caught in legal fisheries upstream of Mission, but simply adding the number of fish expected to be caught to the number of spawners desired does not give the number of fish which must pass Mission to meet escapement targets. Because of en route mortality and/or bias in estimation methods in Mission hydroacoustics, escapement enumeration and catch monitoring, or illegal fishing, it is necessary at times that additional fish pass Mission. For example, if 100,000 fish were required to meet an escapement target and the management adjustment model indicates that 50 percent of the fish that pass Mission will not reach the

spawning grounds, 200,000 fish will be required to reach Mission to ensure the 100,000 escapement target on the spawning grounds.⁵¹⁶

Temperature and high water flow are key drivers that influence spawning migration mortality, but a number of other natural factors also give rise to in-river mortalities (e.g., predation, disease, water quality, incidental harm from fishing, or a cumulative effect from all these factors), as well as the possibility of estimate errors (bias) noted previously.⁵¹⁷

Temperature and flow monitoring on the Fraser River

Monitoring of water temperature decreased in the 1980s and 1990s when DFO took over from the former IPSC (now the Pacific Salmon Commission), but it has now returned to the level that was in place in the 1960s.⁵¹⁸ It is important to maintain the full data set of environmental conditions in the Fraser River to ensure accurate modelling of management adjustments.⁵¹⁹ Currently, DFO monitors in-river temperature to support the EWatch program and the management adjustment work, but Mr. Patterson stated that Environment Canada, which has the mandate to monitor water quality (of which water temperature is one of the main attributes), could be doing more in this regard.⁵²⁰

Management adjustment models

Management adjustments are calculated for run-timing or management groups; for the first three management groups, it has been determined that the most significant factors are flow and temperature, but for the Late-run groups, the most important factor is the timing of their river entry.⁵²¹

There has to be an agreement on the pre-season management adjustments. At this meeting [in June], typically we [Fraser River Panel] would have a long-range forecast of environmental conditions, which would be provided to us by Canada’s Environmental Watch Program. And we would use that input, which is typically two things ... river flow, and

river temperature, as inputs to determine the management adjustments for the Early Stuart, Early Summer and Summer run sockeye. And then for Late Run sockeye, if we are using a management adjustment approach, it would be based on their anticipated upstream timing. So definitely management adjustments, pre-season-wise are finalized, but then of course in-season we adjust them as we see the river conditions change.⁵²²

DFO Science and EWatch Program staff have developed models to create the management adjustments, and DFO's EWatch provides the environmental forecast data to the Pacific Salmon Commission.⁵²³ The commission runs the models pre-season and in-season, using pre-season forecasts or in-season run size estimates and current environmental data, to generate the management adjustment that must be accounted for before any fishery can be opened. After a model is chosen pre-season for a run-timing group, the Fraser River Panel could change the model in-season if the pre-season predictor variables do not provide the best fit or model performance to the in-season variables.⁵²⁴

Mr. Patterson said that studies are currently under way with EWatch and university collaborators to look at the potential impact of different gear types on en route loss. He also said that EWatch is looking at the impact of future climate change scenarios.⁵²⁵

Choice of model

A range of models, each of which has some bias, are used to generate management adjustments. Mr. Patterson agreed that, at present, it is not always clear why a particular model is chosen in-season.⁵²⁶ He said that EWatch is developing a more transparent method wherein management goals / objectives can be identified, and the appropriate model to meet the management goal can be chosen based on the stated goals:⁵²⁷

Clearly, multiple performance measures need to be considered in fisheries analyses ... because of the competing management objectives typically faced by fisheries managers ... When clear objectives are

combined with appropriate affiliated performance measures, model selection through retrospective analysis can be used to provide scientific advice to managers to help increase the probability of achieving fisheries management objectives.⁵²⁸

Management adjustments and differences between estimates

Management adjustments are related to the differences between estimates (DBEs) which are discussed in the section on differences between estimates below. They represent the post-season calculation of the difference between Mission and spawning ground escapement, whereas the management adjustment is the in-season projection of these numbers.⁵²⁹

Findings

Based on the above discussion, I find that management adjustments are useful and important to meet conservation objectives of the Department of Fisheries and Oceans (DFO). As noted by the witnesses who testified on the subject, the data required to support the generation of management adjustments (e.g., in-river water temperature and flow) are important, and I urge DFO and Environment Canada to continue their ongoing work together in obtaining these data.

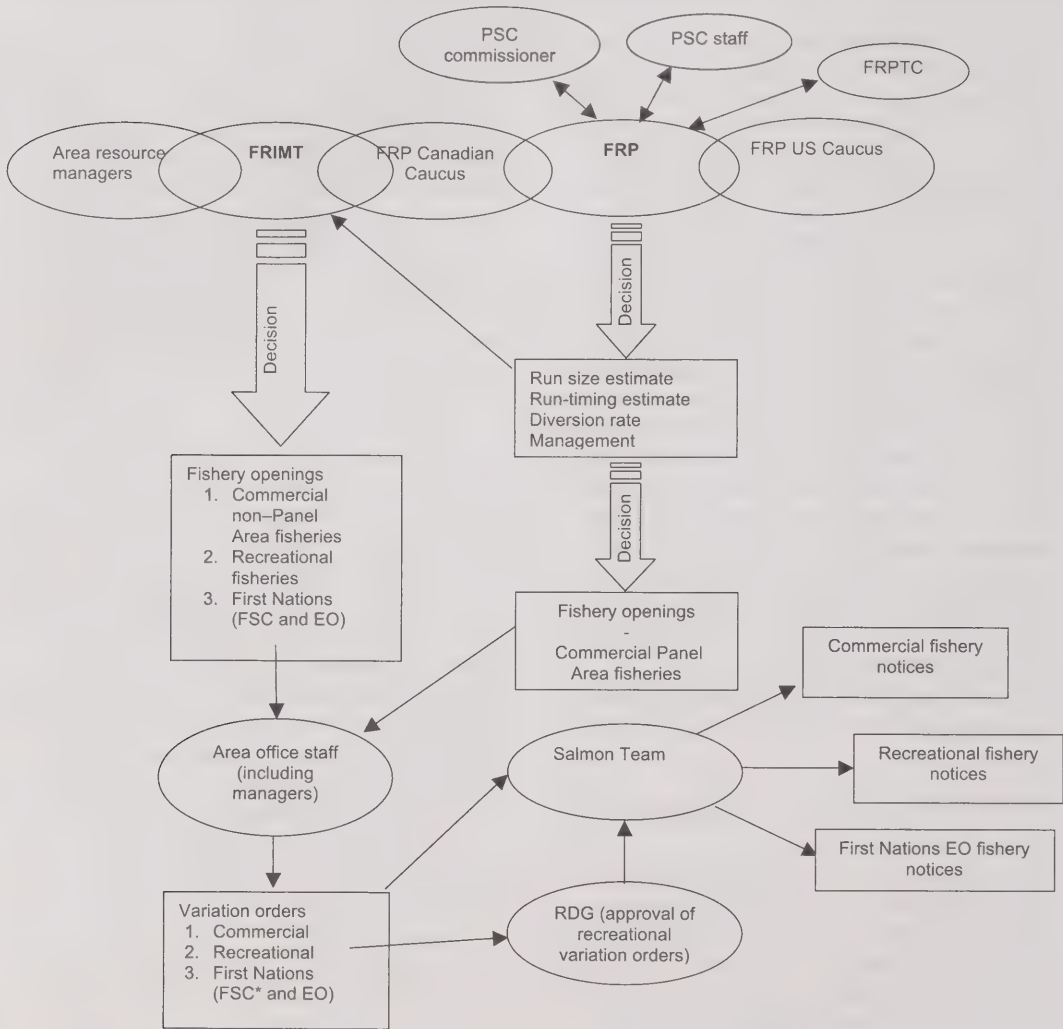
I discuss this finding and any related recommendations in Volume 3 of this Report.

In-season management

In this section of the Report, I describe the in-season management of the Fraser River sockeye fisheries, together with the scientific information that is used in-season to assist with the management of these fisheries (such as run size estimates, test fishing, the use of monitoring equipment at Mission and Qualark, and selective fishing).⁵³⁰ I also discuss monitoring of the fisheries and catch reporting.

DFO and the Fraser River Panel of the Pacific Salmon Commission (PSC) both manage the fisheries in-season, depending on the nature of the fishery (e.g., whether it is commercial or recreational, or for First Nations food, social, and ceremonial [FSC] use)

and its location (the Fraser River Panel does not manage the commercial fishery outside Panel Waters). The interaction between DFO and the Fraser River Panel is complicated, so Commission staff created Figure 1.5.14 to explain the in-season management.



EO: economic opportunity fisheries; FSC: food, social, and ceremonial fisheries; FRIMT: Fraser River Sockeye and Pink Salmon Integrated Management Team (DFO); FRP: Fraser River Panel (Canada and the United States; FRP Canadian Caucus – DFO and non-DFO); FRPTC: Fraser River Panel Technical Committee (Canada and the United States); PSC: Pacific Salmon Commission; RDG: regional director general.

Figure 1.5.14 In-season management of the fisheries

Note: *No fishery notices are generated for First Nations FSC fisheries.
Source: Commission staff.

Transfer of control from DFO to Pacific Salmon Commission

The Fraser River Panel is responsible for all in-season decision making for all of the Panel Area water commercial fisheries (other than First Nations economic opportunity fisheries). PSC staff also perform tasks associated with the fishery (as explained below). Under the Pacific Salmon Treaty, all sockeye (and pink salmon) fisheries under the Fraser River Panel's jurisdiction are closed unless opened for fishing by in-season order of the panel.⁵³¹ Before every fishing season, there is a formal process, through a series of regulatory control letters, for transfer of control from the United States and Canada to the Fraser River Panel of the Pacific Salmon Commission for in-season management of the commercial fishery.⁵³² This process provides the closed-unless-opened regulatory framework.⁵³³

The Fraser River Panel conducts in-season management of the commercial fishery in Panel Area waters, and DFO's Integrated Management Team (described earlier) manages the commercial fisheries outside the Panel Area waters, the recreational fisheries, and the Aboriginal fisheries (FSC and economic opportunity). Mr. Lapointe of the Pacific Salmon Commission described the working relationship between DFO and the Pacific Salmon Commission as excellent, collaborative, and co-operative.⁵³⁴ There is an overlap of DFO personnel on the Fraser River Panel and DFO's Integrated Management Team (as discussed earlier, the same person is the chair of both).⁵³⁵

As part of the in-season management of the fishery, Pacific Salmon Commission staff run (in effect, monitor) all the assessment programs for run sizes, run timing, and diversion rates and make recommendations for run size and in-season management adjustments. PSC staff will also assess catch estimates, assign stock identification, and review fishing plans from both countries.⁵³⁶

The Fraser River Panel determines the run size, run timing, and in-season management adjustments, based on information provided by PSC staff, and sets the opening times (if any) for the commercial fisheries under its jurisdiction.⁵³⁷ The run size and management adjustment decisions result in a calculation of the total allowable catch that DFO uses to decide fishery openings under its jurisdiction.⁵³⁸

In-season management by the Fraser River Panel

The first in-season meeting of the Fraser River Panel will typically be in the first week of July, and it is driven by the status of the Early Stuart sockeye run.⁵³⁹ In-season, the panel generally meets twice a week, once through a conference call and once in person if possible, but will meet more frequently if necessary.⁵⁴⁰ The Fraser River Panel in-person meetings are open to the public (subject to approval by the national caucus) and include members of the Fraser River Panel Technical Committee. For both the teleconference and the in-person meetings, a "listening line" is available to members of First Nations in the watershed as well as each country's national caucus. The Technical Committee meets before the Friday meeting.⁵⁴¹

During the in-season meetings, the Fraser River Panel updates the test fishery results, reviews the stock identification from the Mission site and the catch estimates, and discusses river temperatures and flow. As in-season information warrants, Pacific Salmon Commission staff make formal recommendations for changes to run size abundance estimates and management adjustments for each of the four run-timing groups.⁵⁴² These recommendations take effect after adoption by the Fraser River Panel.⁵⁴³

Following adoption, each national section proposes the opening of particular commercial fisheries, and PSC staff evaluate whether these fisheries are consistent with available harvestable surplus. Mr. Lapointe described the process as follows:

PSC staff provide an evaluation of the proposals against the criteria. Primarily, is the expected catch in a particular fisheries proposal smaller or larger than the available TAC? And if it is smaller than the available TAC, then PSC staff would judge those fisheries consistent with the information. And if we judge them consistent, then the panel would approve those regardless of whether or not one of the countries objected. If we judge them inconsistent, then the panel – the national section whose proposal it is that we have judged inconsistent has two options. They can

resubmit their proposal, change it, modify it somehow to improve the chances that it would be consistent. Or alternatively, the two parties can actually adopt the fisheries proposal by bilateral agreement regardless of the judgment by PSC staff.⁵⁴⁴

If PSC staff judge a national section fishery proposal consistent, then the proposed fisheries can go ahead as stipulated in the Pacific Salmon Treaty.⁵⁴⁵

Under the Pacific Salmon Treaty, Panel Area waters extend beyond Mission, although the Fraser River Panel has not, to date, made decisions on commercial fisheries above that point. Mr. Rosenberger, who is current chair of both the Fraser River Panel and the DFO Integrated Management Team, told me that, if the Fraser River Panel were to take over decision making for all fisheries in Panel Area waters, that would slow its decision-making process. In addition, the US panel caucus might not have the knowledge necessary to make these decisions (in particular, to manage FSC or First Nations economic opportunity fisheries).⁵⁴⁶ Mr. Lapointe agreed and told me that the Pacific Salmon Commission does not now have the expertise to be tasked with the management of fisheries in Panel Area and non-Panel Area waters; as he said, it is theoretically possible, but, pragmatically, it would be difficult because of the representation on the Fraser River Panel.⁵⁴⁷

As discussed above, DFO prepares its IFMP and, once the minister approves it, DFO provides it to the Fraser River Panel. Issues with the panel's in-season management will arise when there is need for a decision (or an alteration) that is not within the parameters of DFO's IFMP because the pre-season planning did not anticipate the in-season reality. Mr. Rosenberger testified that this situation occurred in 2010 and resulted in the Fraser River Panel asking DFO to prepare a briefing note to the minister to make changes to the IFMP.⁵⁴⁸

Mr. Assu, a councillor with the We Wai Kai Nation (Cape Mudge Band) and a member of the Fraser River Panel, urged flexibility around DFO's IFMP where the need arises for an in-season change to it:

I don't believe that the IFMP can ever cover every circumstance that may arise from time to

time, and that as far as the in-season management of the fisheries go, there has to be more flexibility in trying to make changes [to the IFMP] if need be ... [There is a need for] flexibility ... within [the] region here. That's where the decision I think has to be made as far as in-season, rather than having to get the ministerial authority to make changes to the IFMP within the season.⁵⁴⁹

Mr. Morley, who is a member of the Fraser River Panel, also discussed this issue:

[T]he approach, currently, is that whatever rules are laid out in the IFMP process are signed off, as we see, by the Minister on the pre-season plan, and the process to get ministerial change to some of those details, I think, is a very involved, detailed process, going up through the bureaucratic chain ... and most of these circumstances take place in the middle of the summer, when many people are away and very difficult to get a hold of, so I think it's a very cumbersome process to have to go back for every minute detail in that plan to get a ministerial sign-off on a change.

...

[However], I think that the rules that we have adopted in the IFMP are robust enough to [address] situations ... where we end up with fewer fish coming back ... I don't think that ... we have ever been prevented from taking action when there [were] serious conservation problems. I don't think it's at all been prejudicial to conservation, but it certainly has limited the ability for sustainable harvest to be taken by many of the users.⁵⁵⁰

Generally, the witnesses who testified about the Fraser River Panel's in-season management agreed that it was impractical for the Fraser River Panel to operate through a consultative process with representatives of sectors such as the Integrated Harvest Planning Committee (IHPC, discussed earlier), given the nature of the fishery and the decisions that are required on an ongoing basis.⁵⁵¹ Mr. Rosenberger did note, however, that, throughout the season, there is consultation and that information is exchanged between DFO and the sectors.⁵⁵²

I heard differing opinions from witnesses regarding the representation of Canada's Aboriginal peoples on the Fraser River Panel. DFO (through the regional director general, Pacific Region) selects the Canadian individuals who sit on the Fraser River Panel, and the panel members do not represent the interests of the sector with which they may be affiliated – such as commercial or recreational fishing interests.⁵⁵³ Paul Sprout, former regional director general, Pacific Region, agreed that, during a February 2009 meeting of the Pacific Salmon Commission, he said that the representation of First Nations on the Fraser River Panel should be increased to equal up to 50 percent of the membership.⁵⁵⁴

Chief Russ Jones, an alternate commissioner with the Pacific Salmon Commission who is also a hereditary chief of the Haida Nation, a policy advisor to the Haida Fisheries Program, and a member of the First Nations Fisheries Council, told me that the Pacific Salmon Commission and the Fraser River Panel do not adequately accommodate First Nations and are not representative of Aboriginal interests.⁵⁵⁵ Mr. Shepert, who is on the Fraser River Panel, and chair of the Upper Fraser Fisheries Conservation Alliance and a member of the Wet'suet'en First Nation, told me that increased First Nations participation at the Fraser River Panel would take the stress off people like himself and Grand Chief Ken Malloway, of the Stó:lō Tribal Council, who is also on the Fraser River Panel.⁵⁵⁶

It's very difficult for us to purport to represent First Nations issues while I'm clearly very [biased] towards the Upper Fraser. There are people in the Mid Fraser who have [no] participation whatsoever, who have different, as I've said earlier, Upper, Middle, sort of Lower and then approach, slightly different viewpoints on these issues. And it's very difficult to be but one. So I think, as a nominal starting point, that a 50 percent representation by the First Nations on those panels would send a very clear signal.⁵⁵⁷

However, Mr. Rosenberger observed that an individual member of a First Nation may not be able to represent the interests of other First Nations. This particular limitation acts as an impediment

to increasing First Nations representation on the Fraser River Panel:

I think there [are] a few impediments. One is that the First Nations have still not collectively got themselves to the point where[,] when somebody comes, they are there representing either a geographic area or some interest – well, obviously they have an interest, but ... we know that they're there mandated by some area ... and that they're going back. So there [are] some issues around how First Nations people amongst themselves would want to have people appointed. And then the role that they would carry back.⁵⁵⁸

These issues of First Nations representation are discussed more fully in the section below on Aboriginal fishing policies and programs. However, I note that the Pacific Salmon Treaty stipulates the number of representatives who sit on the Fraser River Panel (six from each country, with six alternates).⁵⁵⁹ I heard no evidence regarding the effect of changing the number of representatives on the Fraser River Panel.

Findings

The Pacific Salmon Treaty establishes the in-season management regime for commercial fisheries in the Fraser Panel Area. I make no recommendation with regard to how the Department of Fisheries and Oceans (DFO) and the Fraser River Panel have structured their in-season management of the fisheries.

I understand that those who draft the Integrated Fisheries Management Plan (IFMP) try to anticipate every conceivable eventuality, but sometimes issues arise during in-season management that are not provided for in the IFMP. It is sometimes too time consuming for DFO to obtain ministerial approval for a change to the in-season management process where action is not prescribed by the IFMP. I agree that DFO's managers in the Pacific Region need flexibility in urgent circumstances to make in-season management decisions to respond to circumstances not contemplated in the IFMP without first receiving ministerial approval. My findings on the IFMP are discussed above, and any related recommendations about the IFMP are set out in Volume 3.

■ Fishery decisions

The Fraser River Panel is responsible for in-season decision rules and harvest regulation for the commercial Fraser River sockeye fishery in Panel Area waters.⁵⁶⁰ DFO regulates Aboriginal and recreational fisheries in all BC waters, as well as commercial fisheries in non-Panel Area waters.⁵⁶¹ It is also responsible for in-season enforcement of Fraser River sockeye fishery openings and closings in both Panel and non-Panel Area waters.

Commercial and recreational fishery openings

The Fraser River Panel's Canadian Caucus and DFO's Fraser River Integrated Management Team put together commercial and recreational fishing plans for all Canadian commercial and recreational fisheries.⁵⁶² Mr. Rosenberger said that, for Panel Area waters, the Canadian chair of the Fraser River Panel, on behalf of DFO, has the decision-making authority regarding commercial fishery proposals and, in addition, presents these fishery proposals to the Fraser River Panel and Pacific Salmon Commission staff at the in-season Fraser River Panel meetings.⁵⁶³

Mr. Lapointe explained how PSC staff evaluate the proposals: if the proposals are consistent with available harvestable surpluses, the proposed commercial fisheries can go ahead as stipulated in the treaty.⁵⁶⁴

Once DFO's Integrated Management Team and the Fraser River Panel's Canadian Caucus decide to open a recreational or commercial fishery (and, if the latter is a commercial fishery in Panel Area waters, once the panel approves the fishery), fishery managers in DFO area offices draft variation orders.* For recreational fisheries, the variation orders are sent to the Salmon Team at DFO's Pacific Region headquarters for review. The Salmon Team will draft the appropriate recreational fishery notices, and these, along with the variation orders, are then sent to the regional director general for approval. For commercial fisheries, the area resource managers generate the fishery notices as well as the variation orders, and the notices are approved by the area chief or area head of the office that produces them. Following this

process, the fishery notices go to the Salmon Team for review and posting on DFO's website.

Aboriginal FSC and economic opportunity fisheries

Fishing plans for Aboriginal FSC and economic opportunity fisheries are the product of bilateral planning meetings that are held between each First Nation and DFO area resource managers.⁵⁶⁵ DFO's Fraser River Integrated Management Team reviews and approves these FSC fishery plans, and the regional director general, Pacific Region, and the Fraser River Panel's Canadian Caucus are informed about these fishery openings.

Treaty FSC and commercial fisheries

For the Tsawwassen First Nation (Tsawwassen), the amount of fish available for "domestic purposes" is set out in the Tsawwassen First Nation Final Agreement (Tsawwassen Treaty).⁵⁶⁶ Fishing for FSC or for commercial purposes by the Tsawwassen is by way of a communal licence – similar conditions as for FSC and economic opportunity fisheries for other, non-treaty First Nations.⁵⁶⁷ The Tsawwassen develop annual fishing plans and bring them to the Joint Fisheries Committee, in which British Columbia, Tsawwassen members, and DFO participate.⁵⁶⁸ The fishing plan agreed on by the Joint Fisheries Committee is provided to the minister in the form of recommendations regarding the conditions of the Tsawwassen communal licence.⁵⁶⁹ This licence in turn must be approved by the minister. If, in issuing the communal licence, the minister varies significantly from the provisions recommended by the Joint Fisheries Committee, the minister must provide written reasons to the Tsawwassen and the Joint Fisheries Committee.⁵⁷⁰ The Tsawwassen also have a harvest agreement (which is not part of the Tsawwassen Treaty, although it was negotiated and ratified concurrently with it), and all the Tsawwassen's communal commercial access is set out in this harvest agreement.⁵⁷¹

* A variation order is a variation from the regulatory regime, which says the fishery is "closed until open." Barry Rosenberger, Transcript, January 21, 2011, pp. 9, 10, and 12.

■ Pacific Salmon Commission: run size estimates

An important component of the in-season management of the fisheries is the estimate of the annual run size.⁵⁷² The Pacific Salmon Commission's scientific staff generate the in-season run size estimates, which both the Fraser River Panel and DFO use to manage the fisheries. As with the pre-season forecasting, run size estimates are generated using scientific models that seem complicated to the lay reader.

Dr. Catherine Michielsens, a quantitative fisheries biologist with the Pacific Salmon Commission who reports to Mr. Lapointe, prepared an affidavit in which she described the way in which PSC staff prepare the run size estimates.⁵⁷³ According to Mr. Lapointe, Dr. Michielsens is "leading a substantial overhaul in the uncertainty part" of the Pacific Salmon Commission's analyses of run sizes.⁵⁷⁴

The Pacific Salmon Commission produces in-season run size estimates for each of the four run-timing groups (Early Stuart, Early Summer, Summer, and Late), as well as for some of the subgroups, or individual stocks, depending on the availability of data for the stocks.⁵⁷⁵ Although DFO's pre-season forecasting information (run size, diversion rate, and run timing) is used to assist in the preparation of the in-season estimates, Dr. Michielsens wrote that "pre-season run size probability levels have *no* influence on the in-season run size estimates" (emphasis in original).⁵⁷⁶ In her affidavit, Dr. Michielsens described the process used to estimate the run size as follows:

Run size estimates are predicted in-season using a Bayesian cumulative normal model. The cumulative normal model compares the reconstructed daily migration pattern to ideal run timing curves, assuming the run is normally distributed. By assuming the run follows this idealized pattern, the run size can be estimated once the 50% migration date (i.e. the date 50% of the run has migrated past the reference location, which corresponds to the peak of the normal distri-

bution) has been identified, by doubling the abundance up to that date. Prior to observing the peak of the run, there is considerable uncertainty about the run size. Based on initial observations before the peak of the run, the estimates can indicate the run to be either earlier and smaller than forecast, or later and larger than forecast. The uncertainty about the actual size of the run is estimated using Bayesian methodology. The Bayesian version of the cumulative normal model relies on additional information (pre-season forecasts of run size and timing, expected duration of the run, average historical expansion line estimates and pre-season forecasts of diversion rate) to reduce the uncertainty and keep the run size estimates within realistic bounds. This prior information is incorporated within the Bayesian model through the use of prior probability distributions (priors). These priors indicate a range of values that are assumed plausible for the various model parameters and[,] depending on the shape of the prior probability distribution[,] indicate which parameter values are assumed more plausible than others. Theoretically the Bayesian version of the cumulative normal model should provide more stable estimates since it relies on both in-season data as well as historical data. Indeed, retrospective analyses confirm that incorporating prior knowledge is especially advantageous before the 50% migration is known.⁵⁷⁷

Dr. Michielsens acknowledged in her affidavit that the forecasting of run size involves uncertainty in the following areas, which the Pacific Salmon Commission accounts for by the Bayesian cumulative model:

- Run size uncertainty: ... [accounted for] by describing the range of possible values that the run size can attain and the probability of each value within the range[;]
- Uncertainty about the 50% migration timing of the run[;]
- Uncertainty about the spread of the run[;]
- Uncertainty about the [""]catchability[""] or expansion line which ... provide[s]

an indication of the uncertainty in daily abundance estimates[; and]

- Observation / process uncertainty / error.⁵⁷⁸

These uncertainties apply before, during, and after the peak.⁵⁷⁹ Dr. Michielsens also stated in her affidavit that, before observing the peak of the run, it is very difficult to estimate the run size; accordingly, in-season estimates of run size are influenced by the pre-season forecast.⁵⁸⁰ Once the peak of the run is observed, the influence of the pre-season forecast on the run size estimate is “reduced substantially.”⁵⁸¹ Mr. Lapointe, too, said that uncertainty in the run size is “diminished greatly” once the peak is observed.⁵⁸²

■ Test fishing

Test fishing is, in general terms, fishing for salmon to obtain scientific information – to “test” for different information, based on the fish that are caught. In the Pacific Salmon Commission’s “Policy for Fraser River Panel Authorized Fraser Sockeye and Pink Salmon Test Fisheries,” the stated purpose of the test-fishing program is to collect physical, biological, and “catch per unit effort” information, which is used to provide estimates of run size and other stock assessment data for key stock components of Fraser River sockeye runs.⁵⁸³ Test-fishing results are used to determine progress toward escapement goals and allowable harvest levels and to identify potential directed fishing opportunities.⁵⁸⁴

The Pacific Salmon Commission and DFO use test fishing to obtain genetic information about the stock – through DNA testing, DFO scientists are able to determine the likely stock of origin of the individual fish in the mixture.⁵⁸⁵ Commercial and Aboriginal fishers use test-fishing results to assist with planning for the

season’s fisheries (the commercial and FSC fisheries).⁵⁸⁶ Paul Ryall, former lead, Salmon Team, DFO, and former Canadian chair of the Fraser River Panel, testified that test fishing is considered essential for the management of in-season marine fisheries. It is in gathering information to properly manage the fishery, he said: “Without this information we would be, I would not say totally blind, but we would be missing how we would conduct fisheries in-season and make decisions to manage those fisheries ... without [test fisheries], we would be having a challenge to know what the actual returns are each year.”⁵⁸⁷

The funding of test fisheries and test fishing

Early in the year, the Pacific Salmon Commission provides a test-fishing plan to Canada and the United States which includes the proposed budget required from each country to fund the test fisheries.⁵⁸⁸ A series of spreadsheets prepared by Canada and reflecting the cost of the test-fishing programs for the years 2009–10, 2008–9, and 2007–8 was tendered in evidence.⁵⁸⁹ Once the test-fishing plan is agreed to, Canada transfers funds to the Pacific Salmon Commission to operate the test fisheries, and PSC issues all the contracts for test fishing in Panel and non-Panel Area waters. In non-Panel Area waters, however, DFO staff direct the test fishers.⁵⁹⁰

DFO earmarked funds for test fisheries through its “*Larocque* relief funding” program, a five-year national program running from 2007 to 2011;* however, DFO has not committed to continuing this funding after 2011.⁵⁹¹ Claire Dansereau, deputy minister, told me that DFO is currently in the process of evaluating which elements, if any, of the *Larocque* relief funding program should be renewed.⁵⁹² She said that “most people” would agree that test fishing is

* Before 2006, both DFO and PSC ran test fisheries (the PSC test fisheries for Fraser River sockeye salmon were restricted to the Fraser Panel Area). DFO funded its test fisheries through the sale of the fish caught by the operator of the test-fishing boat. In 2006, however, the Federal Court of Appeal determined in *Larocque v. Canada (Minister of Fisheries and Oceans)*, 2006 FCA 237 [*Larocque*], a case involving the snow-crab fishery in the Gulf of St. Lawrence, that the minister of fisheries and oceans does not have the power to finance DFO’s scientific research activities by selling fish, “a common property resource belonging to all the people of Canada,” and, moreover, a resource managed by DFO (*Larocque* at para. 13).

important, but that she cannot presuppose the outcome of the evaluation.⁵⁹³

The United States continues to fund its portion of the test-fishing budget through the sale of fish caught by the owners of the test-fishing boats.* The Pacific Salmon Commission negotiates the contracts with the operators of the test-fishing boats, pays the fishers, and receives proceeds from any fish caught and sold in Panel Area waters.⁵⁹⁴ In test fishing outside Panel Area waters, the operator of the test-fishing boat will deduct the amount received from the sale of any test fish from the amount owed by the Pacific Salmon Commission.⁵⁹⁵

Administration of test fisheries by Pacific Salmon Commission

Under the Pacific Salmon Treaty, the Pacific Salmon Commission administers the test fisheries of Fraser River sockeye (and pink salmon) in the Panel Area waters, which are primarily Canadian waters, as well as in waters outside the Panel Area (DFO technicians are still involved in the test fisheries outside the Panel Area waters in Areas 12 and 13, which were historically run by DFO).⁵⁹⁶ Although the Pacific Salmon Commission now administers the test fisheries, test fishing has been conducted continuously in the same locations using the same test schedule and the same fishing methods and gear types for many years, in most cases since the days of the International Pacific Salmon Fisheries Commission. In some cases the same fishers have conducted the test fisheries for up to 30 years.⁵⁹⁷

The Pacific Salmon Commission has somewhat reduced the test fishing of Fraser River sockeye

since 2006, primarily in reaction to the *Larocque* decision. Canada has asked the Pacific Salmon Commission to reduce test fishing because of the cost of the program to DFO.⁵⁹⁸ The Pacific Salmon Commission has resisted reductions in test fisheries, because that would have a detrimental impact on its ability to assess the run size (it would create increased variability in the estimated run sizes).⁵⁹⁹ Jim Cave, head of stock monitoring for the Pacific Salmon Commission, and Mr. Assu expressed concern about maintaining test fishing at a reasonable level to provide an appropriate living for test fishers so they can continue to operate in this role; the reliability of the data, they said, depends on the consistency of the test fishers themselves. In addition, because the test fishers must fish whether there are fish in the water throughout the whole season or not, if the remuneration is not adequate to support the boat, gear, and crew, the Pacific Salmon Commission will not be able to find people to do it.⁶⁰⁰

Ms. Farlinger, regional director general, Pacific Region, told me that the test fishery provides key information that informs management decisions and is very important to the day-to-day management of the fishery. She said that DFO's Pacific Region is involved in the evaluation of the *Larocque* funding relief program for test fishing and that, in the opinion of regional management, "in the absence of those test fisheries we would need to have strategies and alternatives in place to manage the fishery that will provide us with adequate information to manage it."⁶⁰¹

Findings

I am satisfied that the test-fishing program is important to the Fraser River sockeye salmon

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 4, Division 18, of Bill C-38 amends the *Fisheries Act*, allowing the minister to allocate fish for financing purposes, as follows:

411. The *Fisheries Act* is amended by adding the following after section 9:

FISH ALLOCATION FOR FINANCING PURPOSES

10 (1) For the proper management and control of fisheries and the conservation and protection of fish, the Minister may determine a quantity of fish or of fishing gear and equipment that may be allocated for the purpose of financing scientific and fisheries management activities that are described in a joint project agreement entered into with any person or body, or any federal or provincial minister, department or agency.

(2) The Minister may specify, in a licence issued under this Act, a quantity of fish or of fishing gear and equipment allocated for the purpose of financing those activities.

fishery, providing valuable information about stock composition, run sizes, and run timing, all of which are crucial to making prudent harvesting and escapement decisions. It is, in my view, essential that DFO's contribution to the cost of the test-fishing program continue.

I discuss this finding and any related recommendations in Volume 3 of this Report.

Test fishing: application and methods

Mr. Cave is head of stock monitoring (the group at the Pacific Salmon Commission responsible for test-fishing and hydroacoustics programs, as well as run size estimates and fishery modelling). He testified that the Pacific Salmon Commission uses the information it obtains through test-fishing to project the run size of each of the management groups, as well as some of the individual stocks, as the fish move through time and space between the day the test-fishing data are collected and the day those same fish reach Mission. In other words, the size and shape of the run as it moves through the marine areas is determined through the use of test-fishing data in conjunction with the data obtained through the Mission site (discussed below).⁶⁰²

The bulk of the test fisheries occurs in the marine environment, according to Mr. Cave, and consist of gillnet fisheries and seine fisheries – in the gillnet test fisheries, all the fish caught are killed, but not in the seine test fisheries.⁶⁰³ A large number of fish may be caught and counted in the test fisheries, but only a subset of fish are retained for further purposes. In the gillnet test fisheries, between 100 and 115 fish are retained for samples (for stock identification, length, and sex and age composition). In the seine

test fisheries, 100–150 fish per day are retained for this purpose.⁶⁰⁴ The Pacific Salmon Commission also operates additional test fisheries for the purposes of stock composition assessment (a gillnet fishery at Cottonwood located near Deas Island in the Fraser River and a variable mesh fishery at Whonnock, near the former Albion Ferry dock on the Fraser River) and for species composition in the vicinity of the Mission hydroacoustic site (a combined drift net and set net fishery).⁶⁰⁵

Mr. Cave said that the test fishing provides the Pacific Salmon Commission with catch per unit effort (CPUE) data,* which it uses to estimate the abundance of the run in the marine areas:

Test fishing vessels in Johnstone Strait (Area 12) and Juan de Fuca Strait (Area 20) collect CPUE data during the migration of salmon to the Fraser River. These data provide an early indicator of relative day-to-day changes in abundance. Daily abundance past the test fishery assessment sites is estimated from CPUE data and estimates of historic catchability.⁶⁰⁶

He explained that, for the Pacific Salmon Commission's estimates of run sizes (discussed above), the “catch per effort times expansion line equals the estimated abundance.” He described expansion lines as factors to calculate abundance and “catchability”† as the proportion of the population that is removed by a fishing operation.⁶⁰⁷

Changes in data used for test-fishery models

Mr. Cave told me that, until 1994, run size assessment was based primarily on commercial

* Catch per unit effort (CPUE) was described as a calculation of the average number of fish that are caught by the specified method – in the case of seines, based on the number of sets that have been made, and in the case of a gillnet, based on the average soak time multiplied by the length of the net expressed in thousand fathom minutes. Jim Cave, Transcript, January 31, 2011, p. 12.

† “Expansion lines are factors used to extrapolate the relative index of abundance in marine test fisheries (CPUE data) to absolute abundance. The inverse expansion line is called the ‘catchability.’ Historic annual expansion lines are generated based on historic CPUE data and historic run-size estimates for individual years. Expansion lines differ from year to year[,] and expansion line estimates used for in-season assessment need to take this uncertainty into account. To account for uncertainty in the expansion line, a prior probability distribution for the expansion line is derived using historic data within an hierarchical model structure. Using hierarchical models, we can estimate both the average expansion line and the variation in expansion lines across years. These models then predict the expansion line for a year for which no data has been observed based on the average across the years and the variation from year to year. The amount of uncertainty in the expansion line will affect the uncertainty in the in-season run-size estimates.” Jim Cave, Transcript, January 31, 2011, pp. 20, 21; Exhibit 315, p. 4.

purse-seine data that, because the fishery took a large percentage of the run, provided good information for run size estimates.⁶⁰⁸ However, given the decline in the commercial fishery, the data from the commercial purse-seine fishery are no longer reliable. Ever since productivity declines began and fisheries were not authorized as frequently as in the past, Mr. Cave said, the Pacific Salmon Commission has depended more on test fisheries to estimate run size.⁶⁰⁹ He testified that, although “it’s a trickier business to do run size estimation now,” he is satisfied with the quality of data the Pacific Salmon Commission receives from the current test-fishing model and with the estimates generated from these data.⁶¹⁰

Mr. Cave also testified that he would like to have better estimates of run timing and, if it were possible, to get this information through more seaward test fishing that would be beneficial. He recognized, however, that this wish may not be practical. He expressed a desire for “small bite fisheries” as test fisheries, which he described as “a small fishery that takes a small amount of fish, but ... surgically in a very short and small clearly-defined area.”⁶¹¹

First Nations involvement in test fishing

Mr. Assu told me that the First Nations Marine Society was formed originally to harvest FSC fish for southern Vancouver Island First Nations bands. These bands did not have the capacity to fish for their FSC allotment themselves. He said that there was a test-fishing component to the fishing conducted by the First Nations Marine Society and that it ran the test fishery for two or three years in certain areas (Areas 12, 13, and 20). He explained that the test fishing ended in 2006 because it was not cost effective for the First Nations fishers involved, particularly when the fishery was limited.⁶¹²

Chief Kimberley Baird of the Tsawwassen testified that she thought First Nations should be involved in test fishing. In her view, it would be “a very positive measure to ensure that if there isn’t any fish beyond the test fishery, that First Nations would have access to those fish that are caught in-season as a starting point.”⁶¹³

■ Hydroacoustic monitoring: Mission and Qualark



Mission hydroacoustic site, Mission, BC, 2010

Hydroacoustic monitoring at Mission

Under the Pacific Salmon Treaty, the Pacific Salmon Commission is responsible for operating (and funding) the hydroacoustic monitoring site at Mission.⁶¹⁴ There, PSC staff collect data through the use of hydroacoustic monitoring to reflect daily returning sockeye abundance at that point in the Fraser River. Coupled with the data obtained in the test fisheries, the data obtained through this monitoring are essential to determining in-season run size. Mr. Lapointe described this information as “the single most important part of the in-season

run-size estimation.”⁶¹⁵ Dr. Michielsens explained how escapement is estimated at Mission:

Daily abundance or “escapement” at Mission is estimated using a split-beam hydro-acoustic system on the south shore (i.e. “left bank”) of the Fraser River, combined with a downward looking split-beam system mounted on a vessel that transects the river. Both of these systems operate 24-hrs a day. Daily estimates of fish abundance past Mission are produced by combining estimates from the shore-based and vessel-based split-beam systems. These daily abundance estimates are more accurate than the daily abundance estimates derived from the test fishing CPUE data.⁶¹⁶

Mr. Lapointe said that the data collected at the Mission hydroacoustic site represent approximately 10–15 percent of the fish swimming up the Fraser River, whereas the fish caught in the test fisheries represent approximately 0.5–1 percent of the fish – accordingly, the Mission data are considered more accurate than test fishing data.⁶¹⁷ In odd-numbered years when the pink salmon are returning to spawn, he said, there is a large overlap of pinks with sockeye, and the Mission estimates are less reliable in those years.⁶¹⁸ The PSC staff use data obtained from the hydroacoustic system at Mission in-season to assess whether escapement objectives can be met and, also, whether there is sufficient abundance to allow for fisheries openings.⁶¹⁹

The Pacific Salmon Commission reviews the hydroacoustic system at Mission and makes recommendations for improvements on an annual basis through both internal reviewers and external reviewers (the Hydro-Acoustic Working Group).⁶²⁰ Although there have been years when there seemed to be problems with the hydroacoustic system, particularly in 2004 when there were notable discrepancies between the abundance estimates at Mission and resulting abundance upstream, no review has found that there are significant issues with the system at Mission.⁶²¹ Mr. Lapointe said that, with the reinstatement of the monitoring site at Qualark in 2007 (described below) and the ability to cross-check the information at both locations, data obtained at the Mission site are more reliable than they had been before 2007.⁶²²



Qualark acoustic site, Yale, BC, 2010

DFO Qualark DIDSON monitoring

DFO originally conducted hydroacoustic monitoring at Qualark from 1993 to 1998 as part of its science programs (under the Pacific Region Science Branch). Following their 1992 review, Pearce and Larkin recommended in their report that hydroacoustic monitoring be located at every major tributary, and the Qualark site was DFO's response.⁶²³

In 2007, DFO Science reinstituted hydroacoustic testing at the Qualark site using a DIDSON (dual-frequency identification sonar) system – a high-frequency, multi-beam sonar with a unique acoustic lens system designed to focus the beam to create high-resolution images.⁶²⁴ Dr. Riddell said that the use of the DIDSON system, coupled with a narrow passage for the fish and a reduced number of pink salmon (the majority of pink salmon spawn before they reach Qualark), allows for more accurate abundance data than the system at Mission.⁶²⁵ Mr. Lapointe described the use of Qualark data as

“a very good crosscheck” or confirmation of the Mission information.⁶²⁶

The Pacific Salmon Commission has begun to use DFO’s data from Qualark to evaluate the Mission numbers. In 2010, adjustments to the Mission estimates were made in-season based on Qualark data (adjusting the numbers up), but it is not known if this practice will continue.⁶²⁷ As well, the Pacific Salmon Commission uses this Qualark information post-season to understand the differences between estimates at Mission and on the spawning grounds.⁶²⁸ In Mr. Lapointe’s opinion, the hydroacoustic monitoring at Mission is most effective in conjunction with the hydroacoustic station at Qualark.⁶²⁹

Mr. Lapointe told me that the Pacific Salmon Commission is not prepared to abandon Mission in favour of Qualark for the following reasons: first, several stocks have spawning grounds before Qualark and cannot therefore be counted at Qualark; second, Qualark is several days farther upstream from Mission, which means that marine and Lower Fraser River fisheries would have to wait a further two or three days for reliable assessments of run size, which would delay fishery openings to the detriment of marine fisheries; and third, the long historical record of retained data is based on Mission data, and there is a desire to maintain the historical record.⁶³⁰

Another major issue is that there is no current funding agreement between DFO and the Pacific Salmon Commission for Qualark:

As stated in the budget memo provided to the [Fraser River] Panel by PSC staff at the October post-season meeting[,] we have obtained an estimate of the approximate annual operating cost of Qualark of \$300,000. This estimate includes approximately \$50,000 for the test fishery[,] which presumably would be funded by Canada out of *Larocque* [relief] funds consistent with other test fisheries. This would leave \$250,000 remaining to be funded. One option for future funding of the program is to continue funding from DFO. Based on preliminary discussions with DFO staff, it appears unlikely that sufficient funds can be found within DFO’s current operational budget. I have been told from Science Branch that Qualark is viewed as an operational program and thus is not appropriate to be

funded from the Science program. This would leave the funding burden in the Stock Assessment Division, which would bring tradeoffs with other Fraser sockeye programs into play.⁶³¹

Mr. Lapointe testified that the Fraser River Panel directed him and his staff to draft a proposal to seek funding bilaterally, but there has been no commitment from DFO to continue to fund the Qualark site.⁶³²

During her testimony in the fall of 2011, Ms. Farlinger told me that DFO considers the Qualark hydroacoustic monitoring station an experimental program that is evolving:

I’d just say that the Qualark program that was run by DFO, and in fact is run by DFO this year based on Salmon Commission funding, has been and continues to be an experimental program. By and large the views are that there are positive results from this program. We continue each and every year to review the evaluation of the escapement with the Mission program and with the Qualark program, and the long-term considerations have to take both those things into account.

The extension of the program this year was fundamentally based on the concept that that evaluation continues to need to be done, which is the contribution of Mission and the contribution of Qualark, and so that’s one of the reasons the program was extended by the Pacific Salmon Commission this year.

...

There are a variety of views on the contributions of the Mission counting facility and Qualark, but it continues to evolve. The Qualark facility continues to evolve, and we will, as we have every year for the last four or five years, continue to take the best information from both of those and make a solution for the following years in terms of how we assess the escapement of stocks.⁶³³

Findings

I am satisfied that the hydroacoustic monitoring programs at Mission and Qualark are important and

contribute valuable data to the management of the fishery. According to Mike Lapointe, chief biologist at the Pacific Salmon Commission, the Pacific Salmon Commission's facility in Mission is the single most important part of the in-season run size estimation, and the data from DFO's Qualark facility provide a good cross-check or confirmation of the Mission data. However, the Department of Fisheries and Oceans (DFO) has not made a commitment to future funding of its Qualark facility. In my view, DFO should continue to provide sufficient funding to enable both the Pacific Salmon Commission to continue to operate its Mission facility and DFO to run its program at Qualark.

I discuss this finding and any related recommendations in Volume 3 of this Report.

■ Selective fishing

Selective fishing is “a conservation-based management approach which allows for the harvest of surplus target species or stocks while aiming to minimize or avoid the harvest of species or stocks of conservation concern, or to release by-catch unharmed.”⁶³⁴ Selective fishing has a long history with Aboriginal peoples.⁶³⁵

According to Dr. Brent Hargreaves, a DFO research scientist who conducted selective fishing research in the 1990s and 2000s, selective fishing allows for the harvest of Fraser River sockeye stocks in abundance while protecting stocks of lower abundance. As such, it can be considered a way to mitigate the effects of declining stocks on fishers.⁶³⁶ For example, selective fishing strategies can provide the opportunity to fish for sockeye in the face of conservation concerns for other salmon species, such as coho, or around specific Fraser River sockeye stocks, such as Cultus Lake (see Chapter 11, Cultus Lake, for a discussion of its case history).⁶³⁷ The options for selective targeting of Fraser River sockeye in marine areas are limited and, according to Dr. Hargreaves:

For [Fraser River] sockeye, most of the conservation units or virtually all of them are single stocks in single lakes. In a mixed stock fishery in the marine approach areas, it's very difficult to sort that out ... it's ... impossible basically for a fisherman to distinguish a Cultus Lake sockeye

from a Harrison sockeye, or some other stock. So the basic sorting ability of selective fishing is not very helpful.⁶³⁸

I was told that management options do exist that allow for some selectivity as marine fisheries target Fraser River sockeye, such as changing gear type and modifying the timing and location of fisheries.⁶³⁹ Dr. Hargreaves explained that the time and area components of harvest management are powerful and can be used “to some degree” to increase selectivity in marine areas.⁶⁴⁰ In the future, he said, it may be possible to use selective fishing to protect certain stocks of the same species based on DNA analysis.⁶⁴¹ According to Dr. Hargreaves, selective fishing is one of the most critical things we can still do:

I think if we don't focus again on selective fishing for both conservation and harvest opportunities, in the new environment, which includes MSC certification, the Wild Salmon Policy, and other constraints that have come on since 2002, there will be no fisheries.⁶⁴²

Ms. Farlinger agreed that selective fishing is a critical tool for salmon fisheries in the Pacific Region.⁶⁴³

Development of DFO's selective fishing program and policy

In the 1970s and early 1980s, worldwide concern grew about conservation and responsible fisheries practices. In 1995, the United Nations Food and Agriculture Organization issued its *Code of Conduct for Responsible Fisheries*.⁶⁴⁴ The purpose of this code, as described by Dr. Hargreaves, was to “describe how to fish responsibly, to conserve stocks of concern and to minimize by-catch ... it sets out guidelines for how to develop responsible fisheries.”⁶⁴⁵ In 1998, Canada's commercial fishing industry developed its own *Canadian Code of Conduct for Responsible Fishing Operations* (Canadian Code),⁶⁴⁶ which approximately 80 percent of Canadian commercial fishing organizations have endorsed.⁶⁴⁷

Principle 6 of the Canadian Code provides, “To the extent practical, fish harvesters will minimize unintended by-catch and reduce waste and adverse

impacts on the freshwater and marine ecosystems and habitats to ensure healthy stocks.”⁶⁴⁸ This principle was described as the one that is most directly related to selective fishing.⁶⁴⁹ The Canadian Code also contains several guidelines, the following of which relate to selective fishing:

Guideline #2.1

Develop protocols (including, when practical and appropriate, the use of selective fishing gears and practices) regarding the catch of non-targeted resources which jeopardize the health of the stocks.

Guideline #2.2

Use only gear authorized for use in a particular fishery.

Guideline #2.3

Ensure fishing activities are not conducted in a fashion that would endanger fish stocks or the environment.

Guideline #2.4

Conduct, in consultation with relevant sectors, research to assess fishing gears, and promote and utilize new fishing gears and practices which are consistent with sustainable fishing practices.

Guideline #2.5

Assist, initiate, and participate in research and assessment initiatives aimed at resource and environmental protection.⁶⁵⁰

The Pacific Salmon Selective Fisheries Program, 1998–2002

Dr. Hargreaves said that, in 1998, selective fishing rose to the forefront of fisheries management in British Columbia as a result of the decline in the southern BC coho and northern Skeena coho and a serious concern for their conservation.⁶⁵¹ DFO established a Coho Response Team and, as part of its Pacific Fisheries Adjustment and Restructuring Program (PFAR), funded the Pacific Salmon Selective Fisheries Program (Selective Fisheries Program) – one that was originally to run

for three years but was extended to four, from 1998 to 2002.⁶⁵²

The Selective Fisheries Program had three goals:

1. Develop and evaluate more selective fishing techniques in commercial, First Nations and recreational salmon fisheries.
2. Facilitate implementation of selective fishing practices in commercial, First Nations and recreational salmon fisheries.
3. Communicate to participants in these fisheries harvesting methods and technologies that will lead to more selective fishing.⁶⁵³

Gordon Curry, former coordinator of the DFO Selective Fisheries Project Authority and its training and education section, who was with the program during its four years, testified that the Selective Fisheries Program had five components: building support and strategies for selective fishing, using experimental pilot projects; a First Nations gear purchase program; research projects; education, training, and communication; and compliance.⁶⁵⁴ During the course of the program, DFO funded a number of selective fishing experimental pilot projects and stated in its final report that the “most significant research investment” was directed at determining salmon mortality after release from fishing gear.⁶⁵⁵

DFO also made these points in this final report:

- Seiners were able to demonstrate a reduction in coho mortality from 25 to 5 percent by employing brailing (removing fish from the seine net with a long-handled smaller net) techniques and allowing coho to recuperate in on-board revival tanks. These techniques allowed access to sockeye and pink fisheries that would otherwise have remained closed because of concerns about coho salmon.
- Gillnetters were able to show that it is possible to reduce coho mortality from 70 to 5 percent by using shortened nets, short set times, smaller mesh size, improved revival tank designs, and careful handling of fish. Changing fishing area as well as fishing only during daylight hours also helped to avoid catching coho.

- Troll gear can selectively catch one species over another by changing plug size. Trollers can also avoid non-target species through time- and area-specific fishing patterns.
- A significant knowledge gap still remains with respect to post-release mortality rates, “but the department plans to continue to investigate solutions.”
- In the recreational fishery, measures implemented included Special Management Zones, barbless hooks in all salmon fisheries, and non-retention of coho.
- The 2001–2 IFMP set out selective fishing measures for the commercial fleet, including brailing of seine sets; net mesh and depth restrictions and set-length restrictions for gillnetters; use of barbless hooks for trollers; fish sorting; and use of revival tanks.
- DFO undertook educational activities, including sponsoring at least one selective fishing workshop in each year of the program, commissioning a selective fisheries review and evaluation, and holding community workshops in 2000–1.⁶⁵⁶

In February 2005, DFO’s Audit and Evaluation Directorate released an evaluation in which it concluded that the Selective Fisheries Program marked “a step in the shift of thinking about selective fishing.” This evaluation determined that, among other things, the program succeeded by implementing selective technologies and gear standards into licence conditions and in maintaining fishing activity under the guidance of IFMPs that contained temporary gear measures and time allocations, all of which helped sustain the industry through a period of low abundance by offering an innovative management approach. The evaluation noted that stock identification research also advanced under the Selective Fisheries Program. However, partly because of a lack of accurate implementation measures and selective fishing compliance indicators needed to measure the program’s progress, the evaluation found “no evidence to suggest the Selective Fisheries Program had an impact in creating a viable and sustainable fishing industry.” The evaluation also stated that the Selective Fisheries Program fell short in the development of selective standards.⁶⁵⁷

Mr. Curry was critical of the 2005 evaluation of the program and told me that a number of the staff involved with the Selective Fisheries Program were of the opinion that the evaluators were not familiar with fisheries. “For instance,” he said, the audit “didn’t recognize the significance of the paradigm shift towards selective fishing, whereby this is a long-term benefit over time of changing how we all view fisheries and how we prosecute fisheries, and the importance of that to move to a more responsible fishery. And that was a significant aspect of this program and I don’t think it was covered that well.”⁶⁵⁸ However, he testified that fishing standards are set out generally throughout the IFMP and in the conditions attached to commercial fishing licences, but that the selective fishing standards are not articulated as a formal set of standards.⁶⁵⁹

Dr. Hargreaves and Mr. Curry were both of the opinion that the program resulted in a “paradigm shift” or a “fundamental shift” toward selective fishing.⁶⁶⁰ Dr. Hargreaves commented:

I think we [DFO] did a very good job during the period of the CFAR [Canadian Fisheries Adjustment and Restructuring] funding. So as I said earlier, this was a fundamental shift in the way that we [DFO] conserved stocks and managed the fisheries for salmon on the Pacific Coast. It meant major changes both within DFO and also within the harvest sectors, all of the harvest sectors. I think the CFAR funding jumpstarted that. It got a lot of people fishing when we wouldn’t have been fishing. It provided opportunities to experiment and to make progress, and I think many people were very excited about that opportunity.

I think with the end of the CFAR funding, even though there was a clause, if you like, in both the Allocation Policy and also the Selective Fishing Policy, that we would continue to use a portion of the available catch, the TAC, the total allowable catch, each year to continue to develop selective fishing, particularly the methods and education, and so on. We didn’t really go there. Very little of that five percent was used. And then subsequently with the *Larocque* decision, it became basically not possible to use the resource to take fish to pay for this sort of thing.

So I think from about 2003 or so, shortly after the end of the CFAR funding, selective fishing has stalled to a large degree. There are a number of elements that continue to be a part of our normal practices, both for conservation and management. For example, things like revival tanks and brailing of sets in seine fisheries, and so on.⁶⁶¹

Both DFO witnesses testified that, after the conclusion of the Selective Fisheries Program in 2002, DFO has conducted little research on selective fishing. According to Mr. Curry, without someone actively working on selective fishing, research has lagged:

Since the end of the program, selective fishing has been carried out through the Salmon Working Group within [DFO] and actual hands-on carried out by the fisheries managers within DFO. And it's without having a directed funding source and without having someone working to continue to work with First Nations and recreational and commercial harvesters to progress with some of these gear and methods that we had started, some that could definitely use completion, there wasn't someone driving that. So it has relaxed and there isn't the same type of push that I feel there should be in order to solve some of these issues that are getting more and more stringent as we move to Wild Salmon Policy, SARA [*Species at Risk Act*] legislation, more and more a need to solve some of these by-catch issues.⁶⁶²

Dr. Hargreaves said this delay in research has led to a critical knowledge gap:

I think one of the biggest gaps, if I can insert it here, is that the question of post-release mortality rates is something that we committed to as a Department that we would continue to work on, and very little work, essentially no work has been done on that since the end of the CFAR Program. And to me that's a critical gap in our knowledge. Even if we developed all the selective fishing methods in the world, and they worked wonderfully, the value of those methods depends entirely on the post-

release survival rates and the effectiveness of those fish to get back and spawn successfully, and we have not addressed in my mind, to my satisfaction, of knowing that we understand that yet.⁶⁶³

However, during her testimony in September 2011, Ms. Farlinger responded to the concerns raised by Dr. Hargreaves and Mr. Curry by telling me that DFO's Pacific Region has "focused on continuing those [selective fishing] tests through the fishery management plans." In making this statement, she was referring to the demonstration fisheries under the Pacific Integrated Commercial Fisheries Initiative.⁶⁶⁴

The Selective Fishing Policy, 2001

In May 1999, DFO released *Selective Fishing in Canada's Pacific Fisheries: A New Direction – The Third in a Series of Papers from Fisheries and Oceans Canada*. This document set out a policy framework and served as a discussion paper among First Nations and stakeholders before the adoption of the selective fishing policy. In January 2001, just over one year before the end of the Selective Fisheries Program, DFO released *A Policy for Selective Fishing in Canada's Pacific Fisheries (Selective Fishing Policy)* as part of *A New Direction for Canada's Pacific Salmon Fisheries*.⁶⁶⁵

Selective fishing is defined in the Selective Fishing Policy as "the ability to avoid non-target fish, invertebrates, seabirds, and marine mammals or, if encountered, to release them alive and unharmed."⁶⁶⁶ Selective fishing is a way to avoid what is called "by-catch," which is described in the Selective Fishing Policy as

[f]ish that are harvested in a fishery, but usually not sold or kept for personal use, as well as seabirds and marine mammals that become entangled or caught by fishing gear ... By-catch does not include fish legally retained in a fishery and kept for personal or cultural use, or that enter commerce through sale, barter or trade. By-catch does not include fish released alive under a recreational catch-and-release fishery management program.⁶⁶⁷

As set out in the Selective Fishing Policy, the stated objective of the policy is

to ensure that selective fishing technology and practices are adopted where appropriate in all fisheries in the Pacific Region, and that there are continuing improvements in harvesting gear and related practices.

Selective fishing is a requisite element of conservation-based fisheries. In meeting conservation objectives, fishing opportunities and resource allocations will be shaped by the ability of all harvesters – First Nations, commercial and recreational anglers – to fish selectively.⁶⁶⁸

The Selective Fishing Policy contains five principles toward achieving that objective:

Principle 1 – Conservation of Pacific fisheries stocks is the primary objective and will take precedence in managing the resource.

A precautionary approach to fisheries management will continue to be adopted in all fisheries, and an ecosystem approach will guide Fisheries and Ocean's [sic] management in future.

...

Principle 2 – All Pacific recreational and commercial fisheries will adhere to selective fishing standards within set timelines.

Fisheries and Oceans Canada will, working with recreational fishing and commercial harvester organizations, develop selective fishing standards and implementation action plans for all Pacific recreational and commercial fisheries by January 2003 ...

Selective fishing standards will be described in the plans for each fishery. The Department will set implementation standards for each fishery. They may be implemented through conditions of licence or, in some cases, through voluntary adoption by licence holders.

...

Principle 3 – In fisheries where selective harvesting standards are not met within prescribed timelines, and by-catches prevent achievement of conservation objectives, fishing opportunities will be curtailed.

...

The Allocation Board described in the October 1999 Fisheries and Oceans Canada policy paper, *An Allocation Policy for Pacific Salmon*, may be tasked with providing advice on such salmon allocations.

Principle 4 – Four fundamental strategies in fishing selectively to minimize mortalities and maximize chances for survival of non-target fish, invertebrates, seabirds and marine mammals will be adopted through increased knowledge of fishing gear and practices.

In order of preference they are

- 1 avoidance of non-target species and stocks through time and area restrictions;
- 2 avoidance through gear design;
- 3 release alive and unharmed before being brought aboard or ashore, through gear design; and
- 4 release alive and unharmed from the deck of the vessel or landing site (e.g. shore or fishing pier).⁶⁶⁹

...

*Principle 5 – First Nations and the recreational and commercial fishing sectors will be responsible for continuous learning and skills development and transfer of responsible and selective harvesting practices.*⁶⁷⁰

In the Selective Fishing Policy, DFO reiterated the policy set out in the Salmon Allocation Policy – that to encourage selective fishing, a portion of the commercial total allowable catch will be set aside for existing commercial licence holders to test alternative, more selective harvesting gear and technology, and over time, commercial allocations will favour those who can demonstrate their ability to fish selectively.⁶⁷¹

As noted above, the Salmon Allocation Policy specifically reserved 5 percent of the commercial TAC for selective fishing experiments in the years 1999–2000 and allowed for the adequacy of the allocation for selective fishing to be reviewed and revised at the end of those two years as necessary. Although the Selective Fishing Program ended in 2002, the ability to use up to 5 percent of the commercial TAC for selective fishing projects remains under the Salmon Allocation Policy. Since the decision by the Federal Court of Appeal in *Larocque*, however, there is uncertainty as to whether the use of TAC for selective

fishing projects is possible.* In the words of Dr. Hargreaves, “[W]ith the *Larocque* decision, it became basically not possible to use the resource to take fish to pay for this sort of thing.”⁶⁷²

Criticism of selective fishing

Mr. Curry agreed that “buy-in” from the various fishing sectors is critical for the continuation of selective fishing and that both the Selective Fisheries Program and the Selective Fishing Policy met with mixed responses.⁶⁷³

In this respect, Mr. Brown, said that, in his opinion, selective fishing is “a marginal issue,” “almost irrelevant” with respect to the Fraser River sockeye fishery, and a “make work project for some individuals in DFO.”⁶⁷⁴ Ms. Scarfo, a commercial fisher, put it this way:

Moving into selective fisheries will make a very small difference on the health and recurrence of building reproductive Fraser River sockeye runs. Selective fishing is one of the tools for commercial fishery to access fish around those runs, but it will not rebuild Fraser River sockeye. So I think you need to keep that in mind, that when we talk about the importance of selective fishing, it is not a rebuilding mechanism. It is a tool for harvesting.⁶⁷⁵

For commercial fisher Mr. McEachern, who is an Area D gillnetter, “[P]art of the problem with a selective fishing strategy and why it got a lot of kickback, pushback over time in my area is that it became seen as very much a political tool as a way to alter the allocation formula in the back room.”⁶⁷⁶

A similar sentiment was expressed by Mr. Morley, who noted that, without an incentive for the commercial fishers, selective fishing would be difficult to implement:

[T]he incentives need to be there, and part of the failing of the selective fishing policy is that any individual or group who have seen [an] advantage in getting access to more fish or more fishing time want to keep doing it because they're getting to fish when other people aren't ... they're getting a special allocation that they wouldn't otherwise get ... everyone's going to be in favour of carrying on if they're in that situation.

What we need to do is provide the incentives for everybody who is willing to undertake the additional cost and additional care to ... actually be able to get something back for that, and I believe that if we get into a share-based system that has allowable by-catch mortalities where we measure total by-catch mortality ... and allocate that as well ... you will find that people will get very inventive and will find new ways in which to fish more selectively within that system.⁶⁷⁷

Selective fishing in the recreational fishery

Ms. Adams, recreational fisheries coordinator, said that, in the late 1990s, DFO conducted research studies in the recreational fishery to examine the difference between J-hooks and circle hooks (both of which are used in the commercial fishery) in terms of their impact on fish, especially in freshwater. The studies found that coho, in particular, would ingest the J-hooks, causing internal damage

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 4, Division 18, of Bill C-38 amends the *Fisheries Act*, allowing the minister to allocate fish for financing purposes, as follows:

411. The *Fisheries Act* is amended by adding the following after section 9:

FISH ALLOCATION FOR FINANCING PURPOSES

10 (1) For the proper management and control of fisheries and the conservation and protection of fish, the Minister may determine a quantity of fish or of fishing gear and equipment that may be allocated for the purpose of financing scientific and fisheries management activities that are described in a joint project agreement entered into with any person or body, or any federal or provincial minister, department or agency.

(2) The Minister may specify, in a licence issued under this Act, a quantity of fish or of fishing gear and equipment allocated for the purpose of financing those activities.

and increased mortality when released; the circle hook, in contrast, caused less mortality because the fish were generally hooked in the mouth. Ms. Adams told me that the recreational fishing community requested that DFO proceed with a regulation under the *Fisheries Act* allowing circle hooks in the recreational fishery; however, she testified that it has been difficult to progress with any amendments or revisions to the *Fisheries Act*.⁶⁷⁸

Ms. Adams also said that there are very limited options for DFO under the existing fisheries regulations to improve selectivity in the recreational fishery. She noted that the main restrictions which could be implemented would be for barbed hooks, the length of the hook shank, and the types of bait.⁶⁷⁹

Frank Kwak, a recreational fisher, described the techniques used for in-river salmon fishing, noting that most people use “bottom bouncing” or “flossing” when fishing for sockeye. He described “bottom bouncing” as taking a 1–4 ounce weight and tying it to a main line, stretching out a leader (6–20 feet), and tying a barbless hook on the end of the leader and baiting it.⁶⁸⁰ Ms. Sneddon, acting program coordinator, Lower Fraser Resource Management, told me that, as a fishing technique in the recreational fishery, bottom bouncing is more selective, but only in clear (marine) waters (as opposed to the turbid or cloudy water of the Fraser River). She explained that bottom bouncing is a selective fishing technique because it causes minimal damage – the hook usually attaches to the mouth of the fish. However, bottom bouncing is indiscriminate and doesn’t meet the criteria for a selective fishing technique, which is to avoid non-target species.⁶⁸¹

Current status of selective fishing

In its 2001 IFMP for the South Coast, DFO introduced selective fishing measures, which were then translated into commercial fishing licence conditions, including the use of brailing and revival tanks for the seine fleet, maximum set times and revival tanks for the gillnet fleet, and the use of barbless hooks and revival tanks for the troll fleet.⁶⁸² These licence conditions and the use of some of the techniques or practices arising out of the Selective Fisheries Program continue to this day (e.g., revival boxes – in which a fish is placed in a box with

running water – or brailing fish out of a purse-seine net using a dip net).⁶⁸³

According to Ms. Farlinger, selective fishing is “very much a topic of interest and policy and evolution” – a reality that is reflected in DFO’s national Sustainable Fisheries Framework, which includes (or will include) a bycatch policy (discussed in Chapter 4, DFO overview).⁶⁸⁴

As quoted above, Dr. Hargreaves told me that the Selective Fishing Policy is still a current policy and that DFO could initiate new efforts to implement it, although no directed program currently addresses selective fishing.⁶⁸⁵ The regional salmon resource manager is the ostensible lead for selective fishing. Mr. Curry and Mr. Grout, salmon resource manager, DFO, told me that salmon managers are implementing selective fishing, but that there is no designated DFO lead for the policy.⁶⁸⁶

Ms. Sneddon testified that DFO is participating in a four-year release mortality study, though it is a short-term study, looking at mortality in fish released from the in-river recreational fishery over a 24-hour period (as opposed to long-term survival).⁶⁸⁷ In the opinion of Dr. Hargreaves and Mr. English, the principal author of Technical Report 7, Fisheries Management, as a result of the cessation of the Selective Fisheries Program there is a gap in the research concerning the long-term survival of released fish. Although some recent work has focused on short-term survival after handling, little research has been done to date on long-term survival.⁶⁸⁸ Dr. Hargreaves considered this information critical: “[T]he value of those [selective fishing] methods depend entirely on the post-release survival rates and the effectiveness of those fish to get back and spawn successfully.”⁶⁸⁹

Findings

I find that selective fishing provides important tools for the Department of Fisheries and Oceans (DFO) to meet its conservation mandate. I accept the evidence that the former Selective Fisheries Program was a useful program. I commend DFO for its stated intention, under the Sustainable Fisheries Framework, to release a national bycatch policy. I encourage DFO to designate an individual to coordinate selective fisheries activities.

I discuss this finding and any related recommendations in Volume 3 of this Report.

■ Fisheries monitoring and catch reporting

In the Terms of Reference of this Commission, I am directed to consider the DFO policies and practices that cover the monitoring and counting of stocks. This section of the Report addresses fisheries monitoring and catch reporting, providing a general overview of the methods employed in the commercial, recreational, and Aboriginal fisheries, followed by a discussion of DFO's monitoring policies and programs.⁶⁹⁰

Knowing the number of fish harvested is important for a number of reasons:

Timely and accurate information on harvest and harvesting practices is essential to assess the status of fish stocks and to ensure the conservation and the long-term sustainability of fish resources. Effective monitoring and accurate catch reporting in all fisheries whether they are First Nations, recreational or commercial are integral to resource management and the enforcement of fisheries rules. They are essential to ensuring responsible fishing. In addition, effective fishery monitoring and accurate catch reporting are equally important to support fishery planning by First Nations, stakeholders and all levels of government. Finally, accurate and timely catch reporting is fundamental to meeting Canada's international and other reporting obligations for fisheries.⁶⁹¹

The information obtained through monitoring and reporting programs is an important component of fisheries management. DFO scientists use the previous years' catch estimates in preparing pre-season forecasting models, which fisheries managers then use to plan the fisheries (as discussed above in the section on pre-season forecasting). Historical catch information is also a component of the models used to set DFO's escapement targets, which are in turn used in fisheries management (as discussed above in the section on pre-season escapement target planning). The Fraser River Panel relies on estimates of catch from Canada in its planning of fisheries in Panel Area waters.⁶⁹² DFO's scientists rely on data obtained through monitoring and reporting to support stock assessment research and activities.⁶⁹³

Accurate catch information is also critical in determining conservation requirements. As stated by

Lester Jantz, area chief of resource management, BC Interior, DFO, without "very accurate catch information, it can be difficult to determine what the impact of a particular fishery may have on ... individual stocks [of concern]."⁶⁹⁴

I received public submissions concerning DFO's monitoring programs, including the following comments:

I fish a native food fishery just above Hell's Gate and the things we wonder about when we are fishing are ... why is there no one to collect information about the fish from me, I am standing at the water holding the fish.⁶⁹⁵

I have many friends that sport fish for sockeye salmon ... It is very common talk for sports fishermen to only claim the limit of the fish that are allowed and not actually claim the limit they really caught.⁶⁹⁶

Fisheries-monitoring and catch-reporting programs and requirements differ among the sectors (commercial, recreational, and Aboriginal fisheries) and among the gear types and areas in the commercial fishery. For several years, DFO has faced criticism of its monitoring.⁶⁹⁷ Those involved in the fisheries have acknowledged that the mistrust directed at DFO is in part attributable to a lack of understanding of the monitoring used in the different fisheries.⁶⁹⁸ As recently as April 2011, the state of DFO's monitoring and reporting was described in the report of the Integrated Salmon Dialogue Forum, *Charting Our Course: Fishery Monitoring in the Pacific Region*, as follows:

BC's salmon fisheries are currently suffering from what might fairly be described as a crisis of confidence. This lack of confidence is in part rooted in concerns over the accuracy and reliability of reported catch. Managers, fishermen and the public at large often don't believe the numbers being reported by other sectors, or even by their own sectors.⁶⁹⁹

The distinction between monitoring and reporting is described in DFO's recent draft Strategic Framework for Fishery Monitoring and Catch Reporting in the Pacific Fisheries⁷⁰⁰ (2010 Draft Strategic Framework):

Fishery monitoring means observing and understanding the fishery and its dynamics. It includes observing and examining the catching and landing of fish and any related activities, such as counting of vessels and gear and sampling of any fish caught. Monitoring is carried out by harvesters, First Nations, and, increasingly, third party observers designated by DFO. Departmental staff including fishery officers, fishery guardians, fishery managers, biologists and scientists also conduct monitoring activities.

Catch reporting means providing information either verbally, in writing or electronically on the catch and other essential details related to the fishing activity (location, gear type, etc.). Reporting is performed by harvesters or by fish buyers, off-loaders or contracted third party dockside monitors / observers (also RDG-designated) on behalf of harvesters.

Other activities associated with monitoring and reporting include the specification of information and biological sampling requirements, auditing of collected data for accuracy and completeness, information management, compliance enforcement of catch reporting regulations and licence conditions, summarizing and analysis of catch and fisheries monitoring data, and the internal communication and public reporting of catch estimates and other information. All of these activities are the Department's responsibility.⁷⁰¹

These definitions reflect that monitoring and reporting activities include reporting both the actual numbers of fish caught (harvested) in the fisheries and the biological information that is obtained during monitoring and reporting.⁷⁰²

Although senior DFO management acknowledge the importance of accurate catch information in fisheries management, as noted in Technical Report 7, Fisheries Management, and reiterated by Mr. English, DFO does not know the true catch values or numbers.⁷⁰³ As he said, "[A]ll the numbers for most fisheries are estimates."⁷⁰⁴ Further, DFO has no process in place to estimate illegal or unauthorized catch.⁷⁰⁵ The issue of illegal or unauthorized catch is discussed in greater detail in Chapter 7, Enforcement.

In the face of criticism regarding its management of the monitoring and reporting data, DFO

has recently introduced management information systems, such as the Catch and Release Estimation Tool (CREST) in 2009, for recreational and some FSC fisheries, and the Pacific Fisheries Data Initiative (PacFish), launched in 2008 and still in its implementation phase.⁷⁰⁶

Monitoring and reporting methods

Methods to monitor and report catch information can be either "fisher dependent" (the individual fisher or group of fishers self-monitor and report their own catch) or "fisher independent" (an independent, third-party source monitors and verifies the catch reported).⁷⁰⁷ In all fisheries where the monitoring and reporting are fisher dependent, there is the potential for inaccurate reporting of catch, whether inadvertent or intentional, and this problem is discussed in turn as each fishery is described.⁷⁰⁸

In its 2010 Draft Strategic Framework, DFO set out the history of its fishery-monitoring programs in the Pacific Region for each sector:

Commercial sector: In 1951, catch reporting began for the commercial salmon fisheries with the submission of sales slips generated at time of landing showing the quantity, value and species of the catch. As fisheries developed, this approach became increasingly flawed due to its failure to account for releases / discards, time lags between fishing and catch deliveries, non-compliance and other problems. In 1998, as part of *A New Direction for Canada's Pacific Salmon Fisheries*, logbooks and on-board observers were introduced to address some of these deficiencies. Harvesters record their kept and released catch and report the results by telephone and mail. In addition to fisher-supplied data, for most commercial salmon fisheries trained and DFO-certified observers collect detailed data on the harvest and bycatch as well as biological samples (e.g. lengths, weights, tissue for DNA analysis).

The use of at-sea observers in the groundfish fisheries dates back to the late 1980s. Mandatory 100% observer coverage was implemented for the groundfish trawl fleet in 1996. By 1994, most of the fleet also had

compulsory dockside monitoring in place, where DFO-approved monitors documented the harvest at designated landing sites. While all groundfish fisheries now require 100% dockside monitoring, this approach is used only periodically in the salmon fisheries, e.g., for the commercial salmon demonstration projects and the lower Fraser River pilot sales fishery.

Other techniques including on-ground hauls, charter patrols and aerial over-flights have also been used to provide gear counts, location and timing of fishing and additional information. The recent emergence of video monitoring and electronic vessel tracking systems offer potential cost efficiencies and more timely data reporting.

Recreational sector: From the mid-1950s through the 1970s, DFO estimates of catch and effort in the sport fishery relied on subjective assessments by fishery officers and small-scale creel surveys. The need for greater rigour and consistency led to the launch in 1980 of a major creel survey program focused on salmon for the Strait of Georgia. Since then, creel surveys have been added for other coastal areas and in some freshwater systems, as the scope of recreational fishing has expanded geographically and to include other species. To conduct these surveys, aerial over-flights estimate effort and fishery technicians visit marinas, boat ramps and river locations to interview anglers about their catch and take biological samples where needed.

First Nations fisheries: For many years, FSC fisheries, like sport fishing, were monitored on an *ad hoc* basis by fishery officers. Currently, methods such as census programs, roving or access point surveys and mandatory landing sites for pilot sales fisheries are being implemented in cooperation with First Nations.⁷⁰⁹

In Technical Report 7, Fisheries Management, the authors evaluated available data on catch estimates of Fraser River sockeye in each of these three fishing sectors noted above. This report provides a qualitative rating of the catch information for each fishery on the basis of accuracy (the degree managers can be confident that the reported catch

reflects the actual harvest), precision (looking at variance around the catch estimate, although the authors noted that this information is not readily available for a lot of the fisheries), and reliability (the degree managers can rely on the catch estimates for in-season and post-season assessments).⁷¹⁰ The findings and commentary of the authors is noted in turn for each fishery discussed below.

Monitoring and reporting in the commercial fishery

Dr. Robert Houtman, a catch-monitoring biologist with DFO's Pacific Biological Station in Nanaimo, described the department's current catch reporting for the commercial fishery.⁷¹¹ DFO requires commercial fishers to complete phone-in reports (or "hails"), typically by early morning the next day or within 24 hours of a day spent fishing, and it tracks these daily reports.⁷¹² All commercial licence holders have a logbook in which they record their catch along with information on the location and hours fished and the number of sets. Commercial fishers are required to return their logbooks at the end of the fishing season to DFO, or to a service provider, and those books are then compared to the daily phone-in reports.⁷¹³ DFO also conducts on-water reporting by a charter patrol or a fishery officer, and dockside monitoring in some commercial fisheries.⁷¹⁴

Dr. Houtman described the use in the commercial fishery of fish slips (or sales slips), which are required for all commercial fish sales. As noted in the excerpt from DFO's 2010 Draft Strategic Framework reproduced above, and in the evidence of Dr. Houtman, enforcement of compliance with generation and submission of fish slips became difficult "as fishers were finding alternative ways to sell fish."⁷¹⁵ Dr. Houtman told me that the decrease in compliance with fish-slip submission "was a major cause for the logbook program to be created about ten years ago."⁷¹⁶

Recently, in commercial demonstration salmon fisheries piloting a quota fishery (Area H troll and Area B seine), participants adopted and agreed to contribute to the funding of enhanced monitoring to verify "all catch" (meaning that all fish caught are counted) through 100 percent mandatory landing site and 100 percent dockside monitoring programs.⁷¹⁷ According to Mr. English, 100 percent

dockside monitoring, compared with no dockside monitoring, should vastly improve the estimates of catch. He said that 100 percent dockside monitoring is generally the approach used in other fisheries to improve the reliability of catch.⁷¹⁸ These pilot fisheries also required participants to provide catch reports by phone or electronic logs (E-Logs) and, in the Area B seine fishery, set-by-set reports to fishery managers and observers.⁷¹⁹

As well, all gear types have been testing the use of E-Logs – a DFO-approved computer application by which the vessel master enters his or her catch information into an on-board computer and the data are transmitted directly to DFO's fishery operations system database (through cell phone or satellite modem from sea).⁷²⁰ Although it is a fisher-dependent reporting system, DFO senior management favour the use of E-Logs and encourage their increased use.⁷²¹

Compliance with certain catch-reporting requirements has been low; for example, in 2004, 63 percent of Area D gillnet fishers returned their logbooks;⁷²² that same year, 56 percent of Area B seine, 68 percent of Area E gillnet, and 50 percent of Area H troll fishers returned their logbooks.⁷²³ In 2005, DFO added requirements that 2006 commercial licences would not be issued until individual fishers returned their logbooks and, since that time, logbook returns dramatically improved and have stayed high, increasing the accuracy of catch-reporting information.⁷²⁴ Dr. Houtman also referred to the recent inclusion of "start-fishing" and "end-fishing" reports as a licence condition that

provides a very strong start of a paper trail that the fisher is on the water, is fishing. Then there's the ability for the Department to confirm that they made a catch report for that day. It provides a very strong sort of incentive for the fisher to comply with the other catch reporting requirements and it's a very practical thing and I think enforceable if C&P [Conservation and Protection] could help enforce start-fishing reports. It's a fairly new requirement so compliance has not been great.⁷²⁵

Dr. Houtman acknowledged the potential for inaccuracies in catch reporting in the commercial fisheries:

Fishers could sort of give the wrong information intentionally or unintentionally. It could be misread or mis-recorded or misheard by the telephone operator if it's a phone-in, or misread by the people who enter the data from the logbooks. So that would be sort of unintentional.

There could be intentional reasons including under-reporting the target species for strategic reasons, if they think that could influence their opening days ... also more likely is under-reporting of sensitive bycatch species.⁷²⁶

However, Dr. Houtman told me that his "sense" and the "Department's sense" is that commercial catch estimates for sockeye are "quite a good estimate." When asked to explain what "quite good" meant, he said that it is "difficult to put a number on" it but suspects that 95 percent of the commercial catch is accounted for.⁷²⁷

The authors of Technical Report 7, Fisheries Management, rated the catch estimates for each of the commercial fisheries, as set out in Table 1.5.8.

Dr. Houtman testified that commercial fishers are "covering basically 100% ... or a large fraction" of the cost of the private company, Archipelago Marine Research, which administers the commercial logbook program, but that it is not certain whether DFO will require commercial fishers to cover the costs of other reporting programs.⁷²⁸ In recent years, DFO has moved some of the costs of monitoring to the commercial fishers (e.g., fishers pay for the enhanced monitoring in the individual transferable quota [ITQ] demonstration fisheries in Area H troll and Area B seine).⁷²⁹ Colin Masson, lead, Enhanced Accountability Element, PICFI, testified that it is DFO's "stated intention" to move costs associated with monitoring onto commercial fishers, especially for enhanced monitoring.⁷³⁰

According to Mr. McEachern, the share-based management fishery (discussed below) improves the accuracy of the monitoring and reporting information: "[W]hen you move the responsibility from a fleet level down to an individual level for your catch monitoring, your landing, your by-catch, issues like that, you will see a greater compliance, because people will feel a stronger connection to that fish as being theirs."⁷³¹

Table 1.5.8 Summary of information related to catch-monitoring programs for Canadian commercial fisheries

Country/ Area	Fishery Location	Fleet Size (2004)	Average Catch (2001 - 09)	% of Catch (2001 - 09)	Catch Reporting	Catch Monitoring System	Validation	Accuracy	Data Quality Precision Reliability
Canada									
Fraser Panel Areas									
Areas 121-122 Troll	WCVI	142 troll in 2002	23,333	2.6%	Daily reports	Daily catch estimates from phone- in reports. Relies on complete catch reporting by fishers	No validation at landing sites, >80% phone-in compliance	Good	Unknown
Area 17- 18 and 29 Troll	Georgia Strait	3-30 troll	38,649	4.3%	Daily reports	Weekly overflight effort counts and average catch rates from fishers phone-in reports and charter patrol hails.	No validation at landing sites, >80% phone-in compliance	Good	Unknown
Area 20 Net	Juan de Fuca Strait	2-60 seine	4,703	0.5%	Daily reports	Overflight effort count every net fishery and average catch rates from fishers phone-in reports and charter patrol hails.	No validation at landing sites, 10-25% phone-in compliance	Fair	Unknown
Area 29 Net	Lower Georgia Strait & Fraser River below Mission	320 gillnet	248,408	27.9%	Daily reports	Overflight effort count every net fishery and average catch rates from fishers phone in reports, a few on-board observers and charter patrol hails. A dockside monitoring program was introduced in 2010 with the goal of sampling 35% of sockeye landings	No validation at landing sites, 10-25% phone-in compliance	Fair	Unknown
Non-Panel Areas									
Area 1-10 Troll & Net	North Coast	250	0	0.0%	Daily Reports	Daily catch estimates from phone- in reports. Relies on complete catch reporting by fishers	No validation at landing sites	Good	Unknown
Area 11-16 Str. & Net	Johnstone Str. & Georgia Str.	230 gillnet 130 seine	450,714	50.7%	Daily Phone In Reports	Overflight effort count every net fishery and average catch rates from fishers phone in reports and charter patrol hails.	No validation at landing sites, 10-25% phone-in compliance	Fair	Unknown
Area 11- 16 Troll	Johnstone Str. & Georgia Str.	105 troll	80,014	9.0%	Daily Phone In Reports	Weekly overflight effort counts from net fishery days and average catch rates from fishers phone in reports and charter patrol hails.	No validation at landing sites, >80% phone in compliance	Good	Unknown
Area 124- 127 Troll	WCVI	142 troll in 2002	6,222	0.7%		Daily catch estimates from phone- in reports. Relies on complete catch reporting by fishers	No validation at landing sites, >80% phone-in compliance	Likely Good	Unknown
Selective Fisheries			37,000	4.2%		Certified observers on board each vessel or at each fishing site	100% of catch validated	High	High
Canadian Total			889,044	100.0%				Fair	Unknown

Source: Reproduced from Technical Report 7, Fisheries Management, Appendix D, p. D-2.

David Bevan, associate deputy minister, focused on the self-reporting aspects of share-based management, which DFO supports:

[W]e've seen tremendous changes in compliance in a number of fisheries, as we've moved to that kind of model where it's the obligations of the fisherman and the participants to tell us how they're going to demonstrate they're in control and that they're compliant with the requirements. It's a reverse onus of proof in those cases. It's not our obligation to prove [to] them that they are out of control, we do that in court, but on an ongoing basis it's their obligation to prove to us and the market and the Canadian public that their harvest is sustainable.⁷³²

However, Mr. Sakich, a commercial fisher, said that commercial fishers are not content to bear the increased expense of the enhanced monitoring.⁷³³ Ms. Scarfo told me that the expense of dockside monitoring (in particular, for small amounts of fish) is so high that, in her opinion, it would bankrupt the majority of the individual commercial fishers.⁷³⁴

Monitoring and reporting in the recreational fishery: creel survey

The bulk of the evidence I heard regarding monitoring and reporting in the recreational sockeye fishery focused on the creel surveys conducted in the Fraser River recreational fishery, which is considered a "moderate to high impact" fishery.⁷³⁵ The creel survey is "a systematic, planned, structured method for assessing recreational effort and catch."⁷³⁶ Its purpose is stock assessment – estimating fish caught – rather than monitoring and enforcement.⁷³⁷

Some recreational fishing of sockeye occurs in the marine environment, generally conducted through fishing lodges and fishing guides; it is considered a "low-impact" fishery.⁷³⁸ As noted by the authors of Technical Report 7, Fisheries Management, recreational harvest of Fraser River sockeye in tidal waters accounted for 7 percent of the total recreational catch of Fraser sockeye

from 2001 to 2009, and the "vast majority of the recreational catch of Fraser sockeye" occurs within the Fraser River.⁷³⁹ DFO has introduced the use of voluntary electronic (and paper) log-books with some sport-fishing lodges and guides in British Columbia, in which the fishing guides provide DFO with catch information.⁷⁴⁰ DFO conducts a creel survey in the Strait of Georgia, but its focus is on chinook and coho salmon (the majority of fish caught in the marine recreational fishery, though any sockeye identified will be counted).⁷⁴¹

Mr. Tadey, who is responsible for the recreational creel surveys for salmon fisheries in the Lower Fraser River, stressed that the creel survey is "completely voluntary ... there's no recourse at all ... should [a recreational fisher] choose not to participate."⁷⁴²

DFO typically conducts the in-river creel surveys from May through mid-October of each year, although in past years it has run longer.⁷⁴³ DFO surveyors will randomly sample recreational fishers during three days of the five-day workweek and all day on weekends and holidays, when there are typically more recreational fishers on the river.⁷⁴⁴

Mr. Tadey explained that the creel survey is a "complemented" survey, which uses two independent surveys – an access survey and "rod counts" (the number of people fishing on the river at a given time).⁷⁴⁵ In the access survey, DFO staff interview recreational fishers as they are leaving their fishing locations at access points along the river (boat ramps or trails), obtaining information from the individual fishers regarding how long they were fishing, their target species (what were they trying to catch), the species of fish they caught, and how many fish they kept and how many fish they caught but released.⁷⁴⁶ During the access survey, DFO staff inspect the fish to verify species identification and collect samples. The access survey provides DFO with information illustrating the rate of what the angler has caught by species.⁷⁴⁷

The rod count has two components, Mr. Tadey explained: an hourly count, in which DFO counts the number of people (or rods) actively fishing at a particular site at the top of every hour, and an "instantaneous effort count," in which DFO counts the number of anglers on

the river during an overflight from Mission Bridge up to the confluence of the Coquihalla River.⁷⁴⁸ The rod counts provide DFO with information on the angler effort.⁷⁴⁹ DFO then estimates the total recreational fishery catch by using a calculation expressed as follows:

To estimate harvest in the Fraser River recreational fishery, we use two key pieces of information:

- 1) a *Rate of Harvest* estimate: in the Fraser Creels, this is expressed as the number of fish harvested per hour of effort (or fish harvested per angler-hour); and
- 2) an *Angler Effort* estimate: this is expressed in hours of angling (or angler-hours).

And one key calculation:

- 1) the *Harvest* estimate is generated by multiplying together the two estimates above ($\text{Rate of Harvest} \times \text{Angler Effort} = \text{Harvest}$).⁷⁵⁰

I heard criticism that the creel survey may not be the most accurate way to monitor or determine recreational catch, given that it is voluntary and the information obtained from individual fishers can be subjective as “the recreational angler tends to exaggerate.”⁷⁵¹ Mr. Tadey said that, in his experience, up to 95 percent of anglers interviewed in the access surveys allowed DFO to inspect their catch, so it was difficult for individuals to minimize the number of fish caught. However, he acknowledged that anglers may inadvertently misrepresent the number of fish that were caught but released, and DFO has no way to verify the number of fish released.⁷⁵² Ms. Sneddon explained to me:

When you’re talking about whether or not somebody’s going to be telling the truth, you have to look not just at the recreational fishery but at all fisheries – all – and you can look at all salmon fisheries and whether or not what type of catch monitoring program they have. If it’s not a mandatory landing program where somebody’s inspecting your catch, there’s the opportunity for somebody to misrepresent, and it may be intentional; it may be unintentional.

And in the recreational fishery for the most part, what we find is if there’s a misrepresentation, it’s usually unintentional. It’s usually more about releases than catch, because we’re inspecting catch. And you know, if you’re in a situation where there’s a lot of fish going through at a time that you’re not allowed to keep [them], when you start releasing them and you get over three or four fish, you start to lose track of how many fish you’ve released.⁷⁵³

The authors of Technical Report 7, Fisheries Management, commented on the importance of accurately counting the number of fish released in a non-retention fishery:

Recent high profile declines in the abundance of some iconic salmon populations (e.g. Interior Coho and Cultus sockeye)[,] coupled with declines in productivity for most Fraser River sockeye stocks[,], ha[ve] raised awareness that accurate estimates of mortality for fish released from mixed stock / species fisheries is crucial for developing sustainable fisheries management strategies.⁷⁵⁴

The creel survey methodology (how DFO arrives at its numbers) was also criticized, because it may be difficult for people to understand, and DFO does not have the resources to educate people about the creel survey.⁷⁵⁵ As well, I heard testimony criticizing the aerial rod counts as a method of enumerating effort, on the basis that the surveyor cannot distinguish the type of fish the fisher is seeking to catch (e.g., similar gear is used to fish for both sturgeon and chinook) or whether an individual in a boat on the river or in the marine waters is actively fishing.⁷⁵⁶

The authors of Technical Report 7, made the following comment about the catch estimates for the recreational fishery:

The overall ratings for recreational fishery catch estimates were “Fair” for accuracy, “Unknown” for precision, and “Medium” for reliability (Table 17). These ratings reflect the uncertainty associated with the catch estimates for the lower Fraser recreational fishery, which represents 93% of the esti-

mated recreational sockeye catch in recent years. In contrast to the creel surveys used to monitor recreational fisheries in Georgia Strait, the documentation of catch monitoring efforts and estimates of precision was notably lacking for the lower Fraser recreational fishery.⁷⁵⁷

Mr. Tadey acknowledged that budgetary constraints limit the geographic scope of the creel survey and that certain areas where recreational fishing occurs are not surveyed. In his opinion, however, the fishing in these areas was 1 percent of the fishery.⁷⁵⁸ He also expressed concern about the ending of PICFI funding in 2012, because those funds were used to hire additional staff to conduct the creel survey during the busy summer months. He said that he would like to see secure funding for seasonal survey staff.⁷⁵⁹

Monitoring and reporting in the Aboriginal fisheries

Aboriginal peoples participate in the commercial sockeye salmon fishery, but in this section I focus on Aboriginal food, social, and ceremonial (FSC) fisheries and on economic opportunity fisheries. In 1992, DFO introduced the Aboriginal Fisheries Strategy (AFS) to provide for, among other things, the effective management of the Aboriginal fishery (the AFS is discussed in the section on DFO Aboriginal fishing policies and programs below). Through AFS agreements, DFO negotiates parameters with Aboriginal organizations for their fisheries and typically provides funding, which may include funding for monitoring programs.

For the purposes of fisheries management, DFO divides the Lower Fraser River area into three sections: from its mouth to the Port Mann Bridge; from the Port Mann Bridge to Mission; and from Mission to Sawmill Creek.⁷⁶⁰ DFO also partitions the BC Interior Aboriginal fisheries into three major management areas: the mid-Fraser, Upper Fraser, and Upper-Upper Fraser areas.⁷⁶¹ DFO's South Coast management area includes all Vancouver Island and the Central Coast of British Columbia, and, in this region, FSC fishing occurs in both the marine and the terminal areas.⁷⁶²

FSC fisheries

FSC fisheries have priority access to the resource, second only to conservation.⁷⁶³ In its 2009 document, *First Nation FSC Catch Monitoring and Reporting: Preliminary Considerations, Standards and Recommendations*,⁷⁶⁴ DFO stated that two key factors determine the specific information requirements for monitoring and reporting in FSC salmon fisheries:

- The paramount consideration is conservation risk. This may range from the need to prevent over-harvesting of a single stock to the need to manage a complex mix of species and stocks. Guidance is provided in the Wild Salmon Policy.
- The need to meet a variety of management objectives such as allocations, assessment of indicator stocks, eco-certification, or ecosystem / habitat effects.⁷⁶⁵

The FSC fisheries conducted in the Lower Fraser River – from the mouth to the Port Mann Bridge area – generally use drift nets and, less commonly, set nets and shallow beach seines. Catch is monitored using a census program for both drift net and set net. Some bands use hail programs, complemented by DFO or Aboriginal fishery officer patrols, and final hail counts are collected by Aboriginal fishery monitors at the close of the fishery.⁷⁶⁶

In the Lower Fraser River – from the Port Mann Bridge to Mission – FSC fisheries are conducted using drift nets, with some set nets and fish wheels. The set net and drift net fisheries are monitored using a census program, with hails collected on the water by charter patrols, and final hails and counts of catch are also obtained at landing sites by Aboriginal fisheries monitors.⁷⁶⁷ As noted by the authors of Technical Report 7, Fisheries Management:

Virtually all of the sockeye harvested in Fraser River FSC fisheries below Sawmill Creek are caught using gillnets[,] and catch estimates are reported after each opening. Below the Mission Railway Bridge, most fishers use drift gillnets. Above Mission, fishers use both

drift and set gillnets but the majority of the catch is taken using set gillnets. The quality of the catch monitoring programs in the lower Fraser River improved substantially through the 1990's, in part because of funding through AFS programs ... Catch estimates for drift net fisheries conducted above Port Mann rely on reports obtained from a fixed set of landing sites. These landing sites probably capture the majority of the catch but not the entire harvest.⁷⁶⁸

In the Lower Fraser River – from Mission to Sawmill Creek – more than 20 groups conduct Aboriginal fisheries, generally using a mix of set and drift net fishing, along with limited beach seines and dip net fishing. The Fraser Valley Aboriginal Fisheries Society (FVAFS) collects drift net catch and effort data, using a census program with on-water hauls or final hauls at landing sites, for all Aboriginal peoples in this area, except for four bands. Set net fisheries are monitored using a survey-based estimation program (similar to the creel survey) conducted by the FVAFS, which collects the data through interviews or overflights, and catch is then estimated by DFO.⁷⁶⁹ Councillor June Quipp of the Cheam Band (Stó:lō) testified that the Stó:lō have a monitoring program where all their fish are counted every week and reported to DFO; the Cheam Band has not signed an agreement with DFO for the past two years, so has not received funding for its monitoring program for those years, but Councillor Quipp was of the opinion that the monitors were “still out there.”⁷⁷⁰

According to Matthew Parslow, acting management biologist for DFO in the Lower Fraser Area, monitoring in the set net fishery in the Lower Fraser River is operated primarily by Aboriginal fishery monitors, with some DFO support (data management and spot checks). He felt that this system gave DFO a “fairly good estimate” of the catch⁷⁷¹ and that possibly 90 percent of the catch, if not more, was accounted for.⁷⁷² However, he agreed that, in the drift net fisheries in the Lower Fraser River, DFO does not have a strong ability to count the nets and relies on hauls, which means DFO is not doing much validation.⁷⁷³ The authors of Technical Report 7, Fisheries Management, made this conclusion:

Overall, we rated the accuracy of catch estimates for Fraser River FSC fisheries below Sawmill to be “Good.” Estimates of precision are limited to a few years but those that are available indicate an adequate level of precision. The overall rating for reliability was “Medium” because of the intensive monitoring of the Mission–Sawmill set gillnet fishery, which accounts for the majority of the harvest, offset by the uncertainty associated with growing drift gillnet effort in the fishing areas between Mission and Hope.⁷⁷⁴

In the Fraser River and Lower Thompson River portion of the mid-Fraser area of the BC Interior, nets and dip nets are used and the fishery is monitored using an aerial roving access survey – a form of creel survey.⁷⁷⁵ For the Upper Thompson River, the fishery is conducted using set nets, beach seines, drift nets, spears, gaffs, and enumeration weirs. This fishery is monitored using a census program. In the Upper Fraser River area, fisheries are conducted using dip nets and one fish wheel, and the fishery is monitored using a census program. In the Upper-Upper Fraser River area, the fisheries are conducted using nets and an enumeration weir, and the fishery is monitored using a census program.⁷⁷⁶ Mr. Jantz told me that the major Aboriginal fisheries in the BC Interior are monitored with programs that provide a “fairly reliable catch estimate under the current funding levels.”⁷⁷⁷

Mr. Jantz testified that DFO verifies the catch in some areas through boat-operated patrols on the river, by talking to individual fishers, and by obtaining verification and samples – not on a daily basis, but periodically.⁷⁷⁸ I heard from witnesses in both the BC Interior area and the Lower Fraser area who said that, on occasion, some individual fishers have chosen not to report their catch, and some bands have refused to report their catch.⁷⁷⁹ Both Mr. Parslow and Mr. Jantz attributed inaccuracy in catch reporting by some Aboriginal organizations in their areas to a reliance on “fisher-reported” data, noting that “there's always the potential that that data could be biased one way or the other.”⁷⁸⁰ According to Mr. Parslow, independent validation of catch would improve the accuracy of the information.⁷⁸¹

First Nations also conduct their FSC fisheries in DFO's South Coast management area, which includes all of Vancouver Island and the Central Coast of British Columbia.⁷⁸² In general, these marine FSC fisheries are conducted by commercial vessels, using different gear (seine, gillnet, and troll). Fishing effort is estimated in terms of the number of fishing permits issued by a First Nation under its communal licence, with some verification by Aboriginal fishery guardians, DFO catch monitors, or charter patrols.⁷⁸³ The authors of Technical Report 7, Fisheries Management, noted:

The majority of the harvest of Fraser sockeye in marine FSC fisheries is taken by purse seine in Areas 12 and 13. DFO reports that most of the seine catch is validated by certified observers on board the fishing vessels or by monitors at the landing sites. The general approach for estimating FSC sockeye catch by seine vessels is to sum up the observed catches and report the total catch on a daily basis. Catch estimates for FSC gillnet and troll fishers are seldom verified and are thus less reliable than estimates for seine vessels. Reports of sockeye caught by gillnet and troll vessels are submitted by the First Nation Bands either weekly or monthly.

Overall, we rated the accuracy of catch estimates for marine FSC fisheries to be "Good" for seine fisheries and "Fair" for gillnet fisheries. No estimates of precision are available for any of the marine FSC catch estimates, thus the rating of "Unknown." The overall rating for reliability was "Medium," which reflects the combination of highly reliable catch estimates for seine harvests and the uncertainty associated with catch estimates for gillnet vessels.⁷⁸⁴

Economic opportunity fisheries

First Nations economic opportunity fisheries for Fraser River sockeye have typically been held in the Lower Fraser area between the mouth of the river and Sawmill Creek, and are monitored using a mandatory landing program with 100 percent validation by a dockside monitor. These programs

are run by Aboriginal monitoring groups funded by DFO through agreements with First Nations fisheries organizations.⁷⁸⁵ Farther up the Fraser River, demonstration economic opportunity fisheries also exist, supported by PICFI.⁷⁸⁶ I heard evidence that, in the economic opportunity fisheries, there is no requirement that the fishers report start and end times for fishing; instead, the First Nations involved send DFO a list of those fishers designated to participate in the economic opportunity fisheries, and, in place of the usual sales slip system, a system of "landing slips" is used.⁷⁸⁷ DFO has no plans to transition monitoring costs to First Nations at this point, although it might in the future.⁷⁸⁸

Post-treaty fisheries

The Tsawwassen First Nation Final Agreement, which came into effect on April 3, 2009, is currently the only modern treaty relevant to Fraser River sockeye. It provides for the management of the Tsawwassen First Nation's Fraser River sockeye fishery by the First Nation itself, including the monitoring and reporting of catch, consistent with DFO regional catch-monitoring and stock assessment standards.⁷⁸⁹

Auditing of catch monitoring by Conservation and Protection

During his testimony, Randy Nelson, regional director of Conservation and Protection, Pacific Region, told me that he believes that "one of the large gaps [is] the accuracy of the catch reporting ... in all fisheries."⁷⁹⁰ He attributes some of the inaccuracies to illegal harvest and told me that, when Conservation and Protection staff (e.g., fishery officers conducting enforcement) observe illegal harvest, they have "regularly over the years ... provided some of this catch information to our resource managers, ... sometimes [they] don't know what to do with it, and it doesn't fit within existing models."⁷⁹¹

Mr. Nelson also believes that fishers don't provide accurate catch information to DFO's monitors; he provided an anecdote where a catch

monitor reported 25 fish caught, but fishery officers later counted 275 fish.⁷⁹² For these reasons, Conservation and Protection staff disagree with resource management staff on the accuracy of catch monitoring.

At one point, Pacific Region Conservation and Protection staff conducted “audits” at mandatory landing sites operated by the Stó:lō, but that no longer occurs. Pacific Region Conservation and Protection staff – in particular, Mr. Nelson – appear open to the idea of playing a larger role in auditing catch reports in the future, given sufficient resources and personnel.⁷⁹³

DFO catch-monitoring policies and programs

DFO has produced policies and programs addressing monitoring, and I address them in this section. As part of its New Directions Policy for the Pacific fisheries,⁷⁹⁴ DFO released the Pacific Region Fishery Monitoring and Reporting Framework⁷⁹⁵ (2002 Monitoring Framework), which was intended to facilitate a review by DFO, in co-operation with First Nations and stakeholders, of fishery-monitoring and catch-reporting systems in the Pacific Region.⁷⁹⁶

The 2002 Monitoring Framework set out seven principles that reflected DFO’s monitoring and reporting “directions and requirements” and were “intended as a starting point for discussion with stakeholders around necessary changes to monitoring and reporting programs in their individual fisheries”.⁷⁹⁷

- Principle 1 – All fisheries must have fishery monitoring and reporting programs and they must be of sufficient accuracy and precision to address conservation needs, including the need for the appropriate and timely control of fishing.
- Principle 2 – Fishery monitoring and catch reporting programs must be adequate to meet the provisions of international treaties and other agreements, First Nation treaties and other domestic agreements or arrangements.
- Principle 3 – Fishery monitoring and catch reporting programs must address all known

significant ecosystem concerns including information on discards, by-catch and habitat impacts.

- Principle 4 – Fishery monitoring and reporting standards will be established for all fisheries and will be the basis for the selection of appropriate fishery monitoring and reporting tools and for establishing appropriate coverage requirements.
- Principle 5 – Data will be collected in the most cost-effective manner to meet the required standards.
- Principle 6 – Harvesters are individually and collectively responsible for providing monitoring information and catch data to the department.
- Principle 7 – All catch and effort data will be owned and managed by the department who will report and release catch data in such a fashion that confidentiality is respected in accordance with the policies determined by the *Privacy Act* and *Access to Information Act*.⁷⁹⁸

Mr. Masson testified that Principle 1 of the 2002 Monitoring Framework recognizes that the “key thing is to ensure information is available to ensure conservation can be achieved” – and that the principle remains true today. Although DFO considers the 2002 Monitoring Framework a foundation for much of the monitoring work that continued, Mr. Masson agreed that it did not receive the necessary attention after 2002 and that it “went off the radar” for DFO.⁷⁹⁹

In September 2004, DFO prepared a draft Recreational Fishery Monitoring and Catch Reporting Consultation Document, which referenced the seven principles of the 2002 Monitoring Framework.⁸⁰⁰ However, Mr. Tadey testified that he had never seen the draft document before it was shown to him by Commission counsel at an interview.⁸⁰¹

In March 2005, the Honourable Bryan Williams released his report, *2004 Southern Salmon Fishery Post-Season Review* (Williams Report), which contained six recommendations relating to catch monitoring.⁸⁰² In June 2005, DFO released its response to the Williams

Report, *Building Capacity and Trust*, in which it committed to improve the department's catch monitoring.⁸⁰³

On April 14, 2005, DFO announced Pacific Fishery Reform – Building a Sustainable Fishery⁸⁰⁴ (also called Pacific Fisheries Reform), which it identified as a response to two external reports: the Joint Task Group on Post-Treaty Fisheries, *Treaties and Transitions: Towards a Sustainable Fishery on Canada's Pacific Coast*,⁸⁰⁵ and the First Nations Panel on Fisheries report, *Our Place at the Table: First Nations in the B.C. Fishery*.⁸⁰⁶ Mr. Masson testified that, through Pacific Fisheries Reform, DFO took “a more focused look at the fishery monitoring issues and [at] developing a broad strategy,” which included the development of a system of standards for fishery monitoring and catch reporting.⁸⁰⁷ In April 2005, DFO announced the Pacific Region Fisheries Monitoring and Catch Reporting Initiative, which was introduced to “plan and implement cohesive, objectives-based, regional fishery monitoring and catch-reporting programs.”⁸⁰⁸ In September 2005, DFO released its *Discussion Paper on the Implementation of Pacific Fisheries Reform* in which it acknowledged that it needed “improved fishery monitoring and catch reporting systems in many fisheries ... [which] will require the full cooperation of harvesters and appropriate cost sharing arrangements between harvesters and DFO.”⁸⁰⁹ In the discussion paper, DFO stated that “catch monitoring and independent validation will be implemented.”⁸¹⁰

In January 2007, DFO launched the Salmon Fisheries Reform – Fisheries Monitoring and Catch Reporting / Traceability Lower Fraser Focus project.⁸¹¹ Its purpose was to design and implement improved oversight of Lower Fraser River salmon fisheries, through monitoring and reporting of catch, together with strengthened enforcement, compliance, and traceability.⁸¹²

In 2007, DFO launched the Pacific Integrated Commercial Fisheries Initiative, a “\$175 million, 5-year [2007–12] initiative, developed to support the implementation of much needed reforms.”⁸¹³ PICFI is structured around four key elements, including the following measures:

Enhanced Accountability Measures

- Will include enhanced fisheries monitoring, catch reporting, and

enforcement, in support of share-based management approaches.

- Will enable development of a new traceability program to address emerging market-place and food safety issues.
- A concrete step towards implementing the recently announced “Ocean to Plate” initiative in Pacific Region.
- Initial steps are planned for the 2007 salmon season in Lower Fraser, with expansion to other areas and fisheries in subsequent years.
- Key components include: mandatory landing sites for Area E fishers with a minimum 35% catch verification, and independent catch verification for First Nations.⁸¹⁴

Mr. Masson, who is responsible for the enhanced accountability element of PICFI, testified that, through PICFI, he focused on ensuring that the catch-monitoring initiative “has legs ... that the lag in progress that we might have observed from 2002 does not happen again.”⁸¹⁵ According to the five-year plan produced by the PICFI Steering Committee in December 2008, DFO had three objectives associated with the enhanced accountability element:

- Increased and sustainable Fisheries Monitoring and Catch Reporting (FM&CR), with a focus on Pacific salmon;
- Enhanced Compliance Monitoring; and
- Development of a Traceability Framework for Pacific Seafoods – to address food safety issues and eco-certification requirements, [and to] enable the tracking of legally harvested seafood products and the identification of product not harvested in legal commercial fisheries.⁸¹⁶

Associated with these three objectives were three main funding areas, described as follows:

- 1) Increased FM&CR
 - Develop and implement strategies for improving FM&CR in priority fisheries:
 - Aboriginal FSC fisheries[;]
 - Recreational – all species;

- Commercial fisheries (salmon ...);
 - Establish and implement catch monitoring and reporting standards[;]
 - Improve FM&CR information management, clarify roles and responsibilities & executive / sector accountabilities for FM&CR.
- 2) Compliance Monitoring
- Foster compliance with monitoring and reporting requirements
 - Provide compliance management in support of the evolving “defined shares” approach to integrated commercial fisheries
 - Create a dedicated unit with specialized training and expertise in intelligence-led policing
 - This involves gathering and analyzing intelligence, identifying and targeting problems and evaluating results
 - Will restrict the access of unlawful product to the commercial marketplace, removing the economic incentive for illegal harvest
- 3) Traceability Framework
- Includes the design and implementation of a program to enable regulators and certifiers to trace fish from the point of harvest to the point of final sale.
 - Collaborative effort with Province, industry, CFIA, and others.
 - Line with / complement national initiatives on traceability and eco-certification[.]⁸¹⁷

Mr. Masson told me that, through PICFI, DFO identified two important roles not previously funded within the department, one providing “integrated fisheries information and ... [looking after an] information management framework,” and the other a “regional monitoring coordination role.”⁸¹⁸

Ms. Farlinger said that DFO is currently in the process of “pulling together” all the work under PICFI, “analyzing what has been done, did we meet all our objectives with the PICFI program, where we haven’t met them, where should we go from here, and those kinds of things that really

happen at the end of a program in terms of, is this ready to implement now, or is there more work required, or what will we do about it to carry it forward?”⁸¹⁹ The work on monitoring commenced under PICFI has continued through the development of the 2010 Draft Strategic Framework (see discussion below).⁸²⁰

In 2008, DFO released a consultation document, *Interim Fishery Monitoring and Catch Reporting Standards for Commercial Salmon Fisheries*, which was to form the basis for discussions with the commercial salmon fleet regarding monitoring and reporting standards.⁸²¹ In February 2009, DFO developed a *Pacific Region Fisheries Monitoring Framework for Improvements*, which was built on the 2002 *Monitoring Framework* and set out a fisheries-monitoring and catch-reporting work plan for 2008–11.⁸²² By late 2009, DFO developed a catch-monitoring *Roadmap Strategy*, which contains four guiding principles:

- Principle 1 – Information necessary to sustain and conserve fisheries resources and their habitat is the first priority.
- Principle 2 – Utilize consistent monitoring standards.
- Principle 3 – Accessible, accurate and timely fisheries data.
- Principle 4 – Harvesters are individually and collectively responsible for providing fisheries monitoring and catch reporting information.⁸²³

The *Roadmap Strategy* contains a matrix for determining whether a given fishery should be monitored at low, moderate, or enhanced levels, based on the degree of conservation risk involved, type of information required, and desired statistical quality for data analysis purposes, as set out in Table 1.5.9.⁸²⁴

In November 2009, DFO released its discussion paper, *First Nation FSC Catch Monitoring and Reporting: Preliminary Considerations, Standards and Recommendations (FSC Discussion Paper)*, created to serve as a starting point for discussions with First Nations, to provide a general context and rationale for improved fisheries monitoring and catch reporting, and to propose a framework for improving consistency across all fisheries.⁸²⁵ As a

Table 1.5.9 Overview of categorizing fisheries based on information requirements, DFO Roadmap Strategy

INFORMATION REQUIREMENT			
<div> Starting Point move to <i>Basic</i> or <i>Enhanced</i> due to specific fishery characteristics </div>			
Information Category	LOW	MODERATE	ENHANCED
Monitoring Need			
Conservation Risk	Low – eg. v. low effort & high abundance (green zone) - no by-catch issues - low relative fishing capacity - single stock/species	Moderate – eg. target and by-catch in yellow zone, - moderate effort, - moderate abundance	Enhanced – abundance of target may be trending to red zone - non-target (by-catch) impacts on CUs of concern - high relative fishing capacity
Fishery Operations; Effort	Ability to determine the key characteristics of the fishery	Ability to quantify effort levels. High consistency across years to establish reliable trends of catch per unit of effort (CPUE)	Accurate and timely records of operational details required (e.g. effort/location/gear details) - managed by defined share/allocation
Catch	Ability to judge magnitude of catch and catch-related mortality relative to other fisheries	Ability to quantify annual catch and catch-related mortality. High consistency across years to establish reliable trends	Accurate and timely records required of catch and catch-related mortality
Ecosystem / Habitat	Ability to qualitatively identify any potential impacts, however, none are anticipated	Ability to quantify the magnitude of impacts (for any species/habitats that apply); some limited impacts are possible	Accurate and timely records required of any impacts (e.g. incident reports for marine mammal/bird/reptile encounters and mortalities. Other ecosystem or habitat effects)
Statistical Quality	Low: +/-50%, little if any independent verification	Moderate: +/-20%, <20% independent verification	High: +/-5%, 20-100% independent verification

Source: Reproduced from Policy and Practice Report 12, Catch Monitoring, p. 44.

fundamental premise, the 2009 FSC Discussion Paper suggests that “shared fishery information, of known and rigorous quality, is the foundation for the dialogue” between government, First Nations, resource users, conservation groups, and others.⁸²⁶

The most recent policy statement by DFO on catch monitoring in the Pacific Region is its 2010 Draft Strategic Framework, developed at the same time that the Monitoring and Compliance Panel (M&C Panel) of the Integrated Salmon Dialogue Forum (ISDF) was producing *Charting Our Course*, its report on catch monitoring in the Pacific Region (discussed below).⁸²⁷ Mr. Masson testified that, although the work of the M&C Panel (on which he sits and which is discussed below) informed the development of DFO’s 2010 Draft Strategic Framework, DFO has “objectives of [its] own that [it] needed to spell out in [its] document.”⁸²⁸

As stated in the 2010 Draft Strategic Framework, its purpose is to set out a strategic framework to guide Pacific fishery monitoring and catch reporting into the future, noting that, despite improvements, “deficiencies remain in information gathering, in terms of coverage of fisheries, missing or unreliable data, reporting delays and other issues.”⁸²⁹ Like the 2002 Monitoring Framework before it, the 2010 Draft Strategic Framework is a consultation document, described by Mr. Jantz as

a consultation ... or discussion document that the Department has developed over a number of years which we are now in the process of taking out for a consultation with the various users of the resource and First Nations in trying to establish exactly what it says, a strategic framework for fishery monitoring into the future for Pacific fisheries. So this is identifying objectives and different levels of monitoring for different levels, different kinds of fisheries and so on and so forth ... we’re trying to develop a final document to be implemented in the 2012 season.⁸³⁰

After restating the fishery-monitoring and catch-reporting goal from its Roadmap Strategy and from *Charting Our Course*, the 2010 Draft Strategic Framework sets out the following five principles:

- Principle 1: Conservation and sustainable use
Fishery monitoring and catch reporting must provide the right information to support prosperous sustainable fisheries that ensure the protection of fish populations, their habitat and the broader ecosystem.
- Principle 2: Consistency and transparency
While monitoring and reporting requirements will vary by fishery, they will apply equally to all harvesters and will be determined based on consistent criteria and in a transparent manner that allows information to be easily accessed and understood by resource managers, other data users and the general public.
- Principle 3: Tailored requirements
Information requirements will depend on the nature and scope of the fishery, reflecting the particular risks and management regime; further, they may change over time.
- Principle 4: Shared accountability and access
Everyone involved in monitoring and reporting – harvesters, DFO and third parties – must be committed to providing timely, accurate fisheries information. Continued access to the resource and its benefits is contingent on all harvesting groups fulfilling their roles in data provision, which in turn demands a clear assignment of responsibilities and accountabilities.
- Principle 5: Cost effectiveness
Fishery monitoring and catch reporting programs will ensure that the information requirements are achieved as cost-effectively as possible.⁸³¹

To achieve improvements in fishery monitoring and catch reporting, and in light of the five principles, the 2010 Draft Strategic Framework sets out six strategies (which are similar to but different from the four strategies set out in its Roadmap Strategy and in *Charting Our Course*):

- Strategy 1: Monitoring and reporting requirements
DFO resource managers to use consistent criteria to assess the information level needed for each fishery and develop tailored requirements for fishery monitoring and catch reporting.
- Strategy 2: Monitoring and reporting programs
[DFO] will work with harvesters and others to identify and implement a cost-effective package of monitoring and reporting measures to meet the specified information requirements.
- Strategy 3: Data management
DFO will complete its major information management project, PacFish, to facilitate access to Pacific fisheries data for resource managers and all other users.
- Strategy 4: Other program support
[DFO] will work with harvesters and others to clarify accountabilities, develop funding mechanisms, identify and address capacity needs, and provide further support for monitoring and reporting programs, as required.
- Strategy 5: Monitoring and reporting plans
A formal monitoring and reporting plan will be prepared and implemented for each fishery that will specify the roles and responsibilities of harvesters, DFO and third parties.
- Strategy 6: Continual improvement
Regular reviews will be conducted to update standards and monitoring and reporting programs and evaluate progress; as well, best management practices and new technologies will be identified.⁸³²

Ms. Farlinger described the 2010 Draft Strategic Framework as a partner process to the work of the M&C Panel, but internal to DFO.⁸³³ She said that the 2010 Draft Strategic Framework is a consultative document that

looks at the fishing power, it looks at various elements related to effective fisheries management and how you have to set standards for different kinds of fisheries, different fishing power, different situations, mixed stock situations and other things, so that DFO is in a position to do its job to set those standards ... I would say that we're quite advanced on that work ... this is partially a social and education process, which is really letting all the stakeholders know that the same criteria are being applied to developing their management standards, and to setting priorities. And therefore to take the work that we do bilaterally with any group or First Nation and put it into this framework so that people understand why the catch monitoring standards are there. That's sort of a really important social step that has been a very big part of the development of catch monitoring in PICFI.⁸³⁴

In response to a question about why DFO would create a document through a separate consultative process that duplicates the work of the M&C Panel (*Charting Our Course*), Mr. Masson explained DFO's rationale as follows:

[I]t became clear in discussions with the senior managers that the Department had objectives of our own that we needed to spell out in our document. It's clearer for the Department to undertake a consultation process where we can specifically engage the harvest sectors for feedback.

Also it's appropriate for the Department to be setting direction for its staff and to establish the appropriate policy foundations by which we can have discussions with our national counterparts on the same issues. So the regional executive had directed that really the Department needs its own framework that establishes its role in trying to develop and firm up policy.⁸³⁵

In 2009–10, through its national Sustainable Fisheries Framework, DFO announced the development of a Monitoring and Compliance Policy; however, DFO has not produced any documents relating to this new policy to date.

ISDF Monitoring and Compliance Panel

The Integrated Salmon Dialogue Forum resulted from a recommendation contained in the 2001 report of the University of Victoria's Institute for Dispute Resolution, *Independent Review of Improved Decision Making in the Pacific Salmon Fishery*, although the ISDF was not formed until 2007.⁸³⁶ It was a collaborative forum where "participants have agreed to make best efforts to work through their respective processes, agencies and organizations to give effect to any consensus reached in the forum, and to address any differences that emerge."⁸³⁷ Volunteer participants in the ISDF were drawn from commercial and recreational fishers as well as First Nations, DFO, and the Province of British Columbia. However, representatives at the ISDF were not mandated to speak on behalf of their groups, and any consensus reached there was non-binding.⁸³⁸

The ISDF Monitoring and Compliance Working Group was one of the ISDF's three working groups. Its purpose was twofold: first, to examine ways to improve monitoring, catch reporting, and compliance in the salmon fisheries by bringing together an independent panel of participants representing Aboriginal, commercial, recreational, and conservation interests; and second, to work with DFO in mapping "a better pathway for monitoring and compliance."⁸³⁹

In 2009, the ISDF created its M&C Panel with a three-year mandate (2009–12).⁸⁴⁰ Mr. Masson testified that the M&C Panel "arose from a recognition that fisheries catch information was a critical piece to get right," recognized by all the participants in the ISDF.⁸⁴¹ This sentiment was echoed by Mr. Crey, fisheries and policy advisor, Stó:lō Tribal Council, during his testimony:

Both [Grand Chief Ken Malloway] and I joined in on the discussions at the Integrated Salmon Dialogue Forum. And in particular both of us were interested in the Monitoring and Compliance Committee, because both he and I know that right at the very heart of the issue in the fishery is [the] confidence that ... groups ... have in the numbers [for] the catches ... that are recorded and reported. We feel that right at the heart of the issue is catch and the reliability of

catch information. So we both zeroed in on the Compliance and Catch Monitoring Committee and the work that it's doing.⁸⁴²

DFO provides funding of approximately \$85,000–90,000 per year to the M&C Panel, which is matched by the Fraser Salmon and Watersheds Program.⁸⁴³

In 2010, the M&C Panel released *Charting Our Course* as a draft discussion paper (the final version was released in April 2011).⁸⁴⁴ Mr. Masson described its purpose as to "develop a framework ... [to] examine monitoring programs in a consistent way ... [and] to serve as a guide to move forward with suggestions and recommendations to the Department and to harvesters."⁸⁴⁵ Mr. Sakich, current chair of the M&C Panel, described *Charting Our Course* as a "living document [which must] keep going in the future."⁸⁴⁶ It sets out the following four principles to guide the development of fisheries monitoring and catch reporting (which are identical to the principles set out in DFO's 2009 Roadmap Strategy discussed above):

- Principle 1: Information necessary to sustain and conserve fisheries resources and their habitat is the first priority
- Principle 2: Use Consistent Monitoring Standards
- Principle 3: Accessible, Accurate and Timely Fisheries Data
- Principle 4: Harvesters are individually and collectively responsible for providing [fisheries monitoring and catch reporting] information⁸⁴⁷

To ensure the use of consistent monitoring standards (Principle 2), *Charting Our Course* provides a matrix, as set out in Table 1.5.10, for determining whether a fishery should be monitored at the basic, moderate, or enhanced levels.⁸⁴⁸

Mr. Masson told me that, in his opinion, Table 1.5.10 captures well the concept of a consistent approach to fisheries monitoring.⁸⁴⁹ In *Charting Our Course*, the M&C Panel acknowledged DFO's development of a monitoring framework and strategy and the way it works with the panel's strategic approach contained in *Charting Our Course* and Table 1.5.10:

Table 1.5.10 Overview of categorizing fisheries

Monitoring Standards and Information Requirements

Starting Point = Moderate Level.

Move to Basic or Enhanced Level based on
Abundance levels, conservation risks and specific fishery characteristics



INFORMATION CATEGORY			
	BASIC	MODERATE	ENHANCED
	CONSERVATION RISK <ul style="list-style-type: none"> • Low – e.g. v. Low effort & high abundance (green zone) • No by-catch issues • Low relative fishing capacity • Single stock/species 	<ul style="list-style-type: none"> • Moderate – e.g. Target and/or by-catch spp in yellow zone • Moderate effort • Moderate abundance 	<ul style="list-style-type: none"> • High – abundance of target spp may be trending to red zone • Non-target (by-catch) impacts on CUs of concern • High relative fishing capacity • High value fishery (incentive to under-report)
	FISHERY OPERATIONS <ul style="list-style-type: none"> • Ability to determine the key characteristics of the fishery 	<ul style="list-style-type: none"> • Ability to quantify effort levels. High consistency across years to establish reliable trends of catch per unit effort (CPUE) 	<ul style="list-style-type: none"> • Accurate and timely records of operational details required (e.g. effort/location/gear details.) • Managed by defined share(s)/allocation.
	CATCH <ul style="list-style-type: none"> • Ability to determine magnitude of catch and catch-related mortality relative to other fisheries 	<ul style="list-style-type: none"> • Ability to quantify annual catch and catch-related mortality. High consistency across years to establish reliable trends 	<ul style="list-style-type: none"> • Accurate and timely records of catch and catch-related mortality
	ECOSYSTEM HABITAT <ul style="list-style-type: none"> • Ability to qualitatively identify any potential impacts. However none are anticipated 	<ul style="list-style-type: none"> • Ability to quantify the magnitude of impacts (for any species/habitats that apply). Some limited impacts are possible 	<ul style="list-style-type: none"> • Accurate and timely records of any impacts (e.g. incident reports for marine mammal/bird/reptile encounters and mortalities; other ecosystem or habitat effects)
STATISTICAL QUALITY	LOW	MODERATE	ENHANCED
	Low: +/- 50%, little if any independent verification	Moderate: +/- 20%, <20% independent verification	Enhanced: +/- 5%, >20% independent verification

Each fishery will be evaluated to determine the level of information required. The factors used in this evaluation will vary depending on the specifics of each fishery, but the goal is to provide consistent monitoring programs across fisheries.

Note: CU: Conservation Unit; SPP: species.

Source: Reproduced from Exhibit 855, p. 10; Policy and Practice Report 12, Catch Monitoring, p. 49.

As a result of growing concerns with fisheries monitoring and catch reporting in the Pacific Region, Fisheries and Oceans Canada released a FM&CR Policy Framework in 2002. The Framework initiated preliminary work on which a broad strategy was subsequently developed to address the fundamental requirements for effective management of fisheries information, development of monitoring standards and for clearly established accountabilities. Since 2007 the Enhanced Accountability component of the Pacific Integrated Commercial Fisheries Initiative (PICFI) has incorporated this strategy. The current PICFI workplan and the proposed strategy for moving forward are therefore consistent and provide a coordinated approach to achieve the objectives and goal outlined in Figure 1.⁸⁵⁰

Charting Our Course sets out four strategies to achieve its vision for improved confidence in fisheries monitoring and catch reporting:

Strategy 1: Use consistent standards to determine monitoring requirements and to plan and implement FM&CR in all fisheries.

Strategy 2: Identify and implement cost-effective monitoring programs for all fisheries to collect required information by sharing best-management practices, considering alternate harvesting and management strategies, and taking advantage of technological advances.

Strategy 3: Implement standardized data format and effective information management systems to enable data integration and timely access to data and fisheries information.

Strategy 4: Clarify and document departmental and harvester responsibilities within a formal monitoring plan.⁸⁵¹

Grand Chief Malloway and Mr. Masson said they felt that the M&C Panel's work had been successful and that its members would like it to continue, because there is still work for it to do.⁸⁵²

The funding of catch monitoring

Fisheries monitoring is conducted by DFO's resource management staff and stock assessment

staff as part of their regular work, relying on ongoing operational funding.⁸⁵³ In addition, DFO has allocated limited-term funds to improve catch-monitoring programs (e.g., PICFI, the funding of which is presently scheduled to end in March 2012). Catch-monitoring activities are part of both ongoing DFO operations and limited-term programs. Some witnesses expressed concern about ongoing monitoring activities in the face of budget cuts.⁸⁵⁴ Mr. Jantz worried about the ongoing monitoring of Aboriginal fisheries, which in his area is funded through PICFI money and scheduled to sunset in March 2012:

[W]e have fairly good coverage under the current funding level that we have. The concern I have is what is going to happen post March 2012. There are opportunities for improving some of the catch estimates in the section of the Fraser River immediately above what we call the mid-river area, so it's the upper Fraser. In that particular area, we don't have full coverage of the fishery and our current funding levels[,] through the AFS [Aboriginal Fishing Strategy] programs primarily, in many years, often do not cover the full duration of the fishery.

As well, [I am] working with some groups that currently do not have AFS dollars. There are a number in the Interior, primarily terminal harvesters, so their catch levels are not very large. But nevertheless, they are not monitored. We do not have information for those fisheries. So working with those groups to try to get some funding and programs established there, whether they're just phone-in numbers or various different techniques for doing that, but that's one area that could be improved.⁸⁵⁵

Mr. Masson told me that DFO has not conducted an assessment of the costs for implementation of the 2010 Draft Strategic Framework, although it is doing some preliminary work on it.⁸⁵⁶

DFO provided a table summarizing its expenditures on catch monitoring in different areas in southern British Columbia from 2000 to 2010–11.⁸⁵⁷ It also provided information regarding its expenditures on the monitoring of Aboriginal fisheries.⁸⁵⁸ According to Ms. Sneddon:

In recent years, resources have been a problem in some times. You don't have enough money to do what you'd like to do. I think any catch monitoring program, whether it's recreational, First Nations, or commercial, some resources – additional resources could help us in getting better estimates. The question is how much better of an estimate? If our point estimate is plus or minus five or ten percent, do you need to spend a lot of money to get plus or minus five percent? It doesn't make any difference in your management, so those are trade-offs that we have to look at when we're allocating our budgets every year.

Questions around over-estimating, under-estimating harvest ... I think there [are] definitely questions from all sectors about the recreational catch and release numbers. We're doing our best in order to educate people around our programs. That's the main problem, is that there's a real lack of understanding of how we do catch-monitoring programs in all sectors.⁸⁵⁹

Findings

I am satisfied that knowing the number of fish that are harvested in the commercial, recreational, and Aboriginal (food, social, and ceremonial [FSC] and economic opportunity) fisheries is an important component of the management of the fishery. It is also essential to the conservation and long-term sustainability of the fishery.

The catch-reporting programs differ among the commercial, recreational, and Aboriginal sectors, and among the gear types and areas in the commercial fishery. I am satisfied that most catch-reporting data are estimates only, and I accept that, where catch reporting is primarily fisher dependent, there is the potential for inaccurate reporting of catch, whether inadvertent or intentional.

The authors of Technical Report 7, Fisheries Management, were unable to do more than provide a qualitative rating of the accuracy of the various catch-reporting methods. In my view, that is not acceptable. The Department of Fisheries and Oceans (DFO) should work toward a catch estimation regime for the Fraser River sockeye salmon

fishery that achieves an enhanced level of fisheries monitoring and catch reporting.

As long as DFO supports a largely fisher-dependent system for catch reporting, it should commit itself to a robust random audit / monitoring program, and it should use its powers of suspension and non-renewal of licences as a compliance tool.

Finally, if DFO decides that those engaged in commercial fisheries should bear some or all of the costs associated with catch monitoring, I see no reason in principle why commercial fishers and those engaged in Aboriginal economic opportunity fisheries should not be treated in the same way.

I discuss these findings and any related recommendations in Volume 3 of this Report.

■ Post-season management and review

Transfer of control from Pacific Salmon Commission back to DFO

The fishing of Fraser River sockeye typically concludes in late September or early October, at which point the Fraser River Panel no longer manages the commercial fishery in Panel Area waters and control is transferred back to DFO as the various runs of salmon complete their cycles. The regulatory letters specify the dates on which the Fraser River Panel will relinquish control in Panel Area waters – typically when the commercial fisheries are completed.⁸⁶⁰

Fraser River Panel post-season review

Following each management season, the Fraser River Panel first holds a post-season meeting to assess the fishery relative to the predictions and, second, prepares a post-season review for consideration at the January meeting of the Pacific Salmon Commission and the Fraser River Panel. After the conclusion of the fishing season, the panel has two main objectives: to establish a post-season accounting of the total return for each of the stock groups, and to prepare a report that documents the main events of the season and

the achievement of objectives specified under the Pacific Salmon Treaty.⁸⁶¹

DFO post-season review

DFO prepares three reports in the post-season phase of management of the Fraser River sockeye fishery: the Record of Management Strategies; the Pacific Salmon Treaty Report (in which both Canada and the United States are obliged to report their allocations, limits, and conditions under the treaty); and a post-season report for southern BC fisheries.⁸⁶² DFO also hosts post-season review meetings with the Integrated Harvest Planning Committee, First Nations representatives (independent of the IHPC process), the Sport Fishing Advisory Board, and the Commercial Salmon Advisory Board.⁸⁶³ DFO evaluates its own performance in meeting its spawning escapement objectives, as well as the allocations to First Nations and to commercial and recreational fisheries.⁸⁶⁴

■ Differences between estimates

Mr. Lapointe, told me that, in 1992, the Fraser River Panel started to track the “differences between estimates” (commonly referred to as DBEs) of Fraser River sockeye – between the one made at the Mission hydroacoustic location and the one made on escapement by DFO.⁸⁶⁵ As discussed above in the section on management adjustments for the Fraser River sockeye fisheries, a difference is always anticipated between the estimates made at Mission and the escapement estimates at a particular spawning ground. Mr. Lapointe described this difference as a “subtlety” about Fraser River sockeye: “[T]here is an element of the management that’s outside your control that relates to the impacts of these fish [sockeye] in the river that causes your escapement target to not be anywhere near what you would have hoped it would have been.”⁸⁶⁶

The differences between estimates is calculated as part of the Fraser River Panel’s post-season analysis and, except that it is retrospective, it addresses issues similar to management adjustments

in pre-season and in-season planning. It is a calculation of the difference between the post-season escapement estimate on the spawning ground and the abundance estimate at Mission (minus any catches between Mission and the spawning grounds), and Mr. Lapointe described the process in these words:

[W]e compare the number of fish that reach the spawning grounds with the number of fish that we would have expected to reach the spawning grounds where that latter quantity is estimated by taking the Mission escapement and subtracting any catches that occurred between Mission and the spawning grounds. So it’s a projection of what should have reached [the spawning grounds] if all the fish made it and the Mission escapement was correct and the catch estimates were correct, as well.⁸⁶⁷

Mr. Lapointe provided a PowerPoint presentation explaining the differences between estimates.⁸⁶⁸ On the first page, the calculation of 195,000 for 2009 (the potential spawning escapement minus the counted upstream spawning escapement) is set out as follows:

Mission escapement	1,303,000
– Catch upstream of Mission	52,000
– En-route losses	???
= Potential spawning escapement	1,251,000
Upstream spawning escapement	1,056,000
Difference Between Estimates =	195,000 ⁸⁶⁹

The Fraser River Panel must determine what the total run size was and whether the differences between estimates represent real fish that were lost or simply bias in the estimates. The possible causes of the differences between estimates are statistical error; measurement or statistical bias in the abundance estimate at Mission; bias in the estimates of in-river catch (e.g., because of illegal harvest or of unreported or misreported catch); en route losses (fish die en route because of biological and environmental conditions); and measurement or statistical bias in escapement enumeration.⁸⁷⁰

The results of the difference between estimates analysis are fed back into the data used

to run the management adjustment models pre-season and in-season.⁸⁷¹ These calculations are made every year, and the Fraser River Panel must decide whether they should be part of the estimate for the total run.⁸⁷² This decision is based on whether the difference between estimates is likely to be a real loss of actual fish (through mortality in-river) or whether it is due to measurement bias or errors.⁸⁷³ Mr. Lapointe said that the Fraser River Panel is finding that the majority of the calculations since 1992 associated with real en route loss of fish are attributable to factors such as high water temperature or high or low water flow.⁸⁷⁴

■ Stock assessment

Stock assessment for Fraser River sockeye, in particular spawning ground assessment, has been a priority for DFO because of the Pacific Salmon Treaty.⁸⁷⁵ Stock assessment also includes test fishing and run size assessment, but in this section of the Report I review the stock assessment conducted in freshwater (escapement enumeration, juvenile / smolt assessments, and lake productivity assessment) – the main focus for DFO in its Stock Assessment section. Dr. Brian Riddell, now chief executive officer of the Pacific Salmon Foundation but formerly with DFO, stressed the importance of stock assessment in his testimony:

Stock assessment is long-term monitoring ... there is an annual need for advice for managers and management. Fundamentally though you're talking about the long-term monitoring of Canada's natural resources and I see that that's a core responsibility of [DFO] and [DFO puts] a lot of effort into [it].⁸⁷⁶

Timber Whitehouse, area chief, Fraser Stock Assessment Program, DFO, explained to me that DFO's stock assessment program is based on science. He said that, with respect to Fraser River sockeye, the stock assessment program includes the following tasks:

- "escapement enumeration of spawning grounds (which involves the assessment of adult spawning stocks of salmon as they return to their

spawning grounds, including detailed assessment and calculation of abundance)",⁸⁷⁷

- "assessments of fry (juvenile) production out of incubation habitats, as well as irregular (only in years of large escapements) assessments of some fry abundances in sockeye nursery lakes throughout the watershed",⁸⁷⁸
- "nursery lake productivity assessments (the ability of a lake to support juvenile sockeye, based on the food bases and chemical and physical properties of the lake nutrients)",⁸⁷⁹ and
- "monitoring of smolt output at Chilko and Cultus lakes."⁸⁸⁰



Sampling of spawners, Adams River, BC, 2010

Mr. Whitehouse explained that stock assessment is used to understand population dynamics and the production of different stocks, both in the run size forecasting process and in developing post-season estimates of total return (for looking at calculations of total allowable catch [TAC] and for obligations under the Pacific Salmon Treaty).⁸⁸¹

The Wild Salmon Policy, in its Strategy 1, envisions a formalized stock-monitoring plan that features monitoring specific to each Conservation Unit. Mr. Whitehouse told me that DFO's current

stock assessment activities are aligned with, and support the delivery of, the Wild Salmon Policy because the way the sockeye are counted “allows you to roll the escapement data up to the level” of a Conservation Unit (see the discussion in Chapter 10, Wild Salmon Policy).⁸⁸²

Adequacy of escapement enumeration methods

Mr. Whitehouse told me that escapement enumeration has high-precision and low-precision methods. Low-precision methods come in two forms: visual counts that are not calibrated, and recovery of salmon carcasses as an index of the number of fish. High-precision estimates use techniques such as mark-recapture surveys, fence counts, hydroacoustics, and calibrated visual surveys. He said that the methods used to enumerate the fish are well established and are considered scientifically reliable.⁸⁸³

In 2005, because of funding pressures, DFO raised the escapement threshold for the use of the mark-recapture method from populations larger than 25,000 to populations larger than 75,000.⁸⁸⁴ Some people had concerns about this change: Mr. Saito, former DFO fisheries manager and former chair of the Fraser River Panel, said that he recalled discussing this change with his DFO colleagues at the time the decision was made and that he felt it was a reasonable accommodation; under cross-examination, he agreed that this policy change would diminish the quality of the stock enumeration data.⁸⁸⁵

However, Mr. Whitehouse said that there are very few populations in this range (between 25,000 and 75,000), and accordingly, DFO is of the opinion that the change did not have a negative impact on stock assessment. He acknowledged that there is an unresolved issue regarding the appropriate calibration / expansion index for spawning populations in the 25,000–75,000 range, but said that DFO Science staff are conducting research on this issue.⁸⁸⁶

Assessments of fry and nursery lakes

DFO also conducts assessments of fry abundance in nursery lakes and some rivers, using hydroacoustics and mark-recapture.⁸⁸⁷ In addition, it does habitat assessments of nursery lakes, which involve

detailed assessment of algae and zooplankton communities in each lake as well as its chemical and physical properties.⁸⁸⁸ In the 1980s and 1990s, DFO conducted a fairly extensive survey of nursery lakes within the Fraser River watershed, though Mr. Whitehouse said that this program is currently not as extensive.⁸⁸⁹

Smolt assessments

DFO regularly monitors smolt outmigration at Chilko and Cultus lakes through the use of fences.⁸⁹⁰ Mr. Whitehouse said, however, that Chilko Lake is a unique system and is unlikely to be a valid indicator for freshwater productivity, although useful as an indicator of marine survival.⁸⁹¹

Budgeting, funding, and cuts

DFO's Stock Assessment Coordination Committee (discussed earlier) is responsible for regional coordination of priorities for stock assessment in the Pacific Region.⁸⁹² The Science sector, however, has budget responsibility for regional stock assessment work.⁸⁹³

I received a public submission from the Rivers and Smith Salmon Ecosystems Planning Society (RSSEPS), based in Comox, which reads:

It is our impression that the DFO Stock Assessment budgets have been progressively diminished over the years. It seems as if the government has made the decision to give preferential option to the aquaculture industry. With fewer financial resources, it falls to non-profits like RSSEPS to take on the responsibility of monitoring local fish stocks.

We would like the Commission to examine DFO's Stock Assessment budgets to determine the minimum amount of funding required to adequately monitor and manage stocks of wild Pacific salmon.⁸⁹⁴

The stock assessment program illustrates DFO's A-based versus B-based funding. A-based funding is core government funding; B-based funding is money for specific projects.⁸⁹⁵ In 1985, with the signing of the Pacific Salmon Treaty, the Pacific Region received \$32 million in B-based

funding for stock assessment programs through 1999 (a fixed amount for a fixed term, not part of the department's core budget).⁸⁹⁶ However, in 1999, when the treaty was revised and renewed, the associated B-based funding was rolled into A-based funding, which is subject to ongoing core budget reductions.⁸⁹⁷

Mr. Whitehouse said that the cyclic dominance of Fraser River sockeye creates difficulties for stock assessment budgeting because the assessment needs vary with the cycles – dominant cycle years require additional funds that are not acknowledged in budgeting.⁸⁹⁸ DFO has reduced juvenile and nursery lake productivity assessments from the level it conducted in the 1980s and 1990s, and from the level the former International Pacific Salmon Fisheries Commission conducted before it.⁸⁹⁹ Although Fraser River sockeye is a top priority for DFO, and the programs relating to it have suffered fewer budget cutbacks than other programs, the cutbacks to stock assessment of other species may have an adverse effect on the sockeye fishery (by requiring restrictions on salmon co-migrating with threatened species where assessment of those other species is inadequate) and on DFO's ability to assess the stocks in the red zone under the Wild Salmon Policy.⁹⁰⁰ Mr. Whitehouse told me how critical the situation is:

We're reaching a critical tipping point in terms of being able to provide the necessary monitoring, particularly outside of the Fraser. I think this is an important distinction that is worth making for this commission, that maintaining Fraser sockeye assessment has come at a high cost and that there are not many additional pieces that can fall off without getting to the point where the word "crisis" could come into play.⁹⁰¹

Findings

I am satisfied that stock assessment is essential to the management of the fishery, including data obtained through assessments of nursery lakes, juveniles, and escapement, and that all of these calculations are important aspects of stock assessment. In addition, I encourage the Department of

Fisheries and Oceans (DFO) to assess smolt outmigration at the mouth of the Fraser River. I accept the evidence of Timber Whitehouse, area chief, Fraser River Salmon Stock Assessment, that DFO's escapement enumeration methods are adequate, with the caveat that the department needs to determine the calibration factor in populations ranging from 25,000 to 75,000.

I also accept the evidence that further funding cuts to DFO's current stock assessment programs for both Fraser River sockeye and other Fraser salmon stocks could adversely affect the conservation of the resource and the sustainability of the Fraser River sockeye fishery.

I discuss these findings and any related recommendations in Volume 3 of this Report.

■ Aboriginal fishing policies and programs

Managing the fishery in the context of Aboriginal rights

As described in Chapter 3, Legal framework, the Supreme Court of Canada has articulated an analytical framework to determine Aboriginal and treaty rights. However, this analysis has not been judicially applied for the majority of Aboriginal groups asserting rights in the Fraser River sockeye salmon fishery. Evidence before me indicates that many Aboriginal groups in British Columbia assert the right to fish, to manage the fishery, to share in the economic benefits of the fishery, and, in some cases, to Aboriginal title.⁹⁰² Significant legal uncertainty surrounds what rights are held by which groups and what management, economic, title, or other dimensions these rights may or may not include.

As Commissioner of this Inquiry, my jurisdiction is circumscribed by my Terms of Reference.⁹⁰³ Several participants appearing before me, Aboriginal and non-Aboriginal, submit that my Terms of Reference do not provide me with jurisdiction to make rulings or findings of fact in respect to Aboriginal or treaty rights and that I am not called upon by them to do so.⁹⁰⁴ Indeed, my Terms of

Reference do not refer to Aboriginal or treaty rights at all.

Taking into consideration my Terms of Reference, the existence of ongoing litigation over Aboriginal fishing rights, and the limited time frame for this Inquiry, I agree with participants that I am not well placed to make any determination of Aboriginal rights, including any right to fish. I am also not well placed to make findings of fact that depend on an assessment of rights, such as whether a particular right was infringed in a specific circumstance, whether any infringement was justified, or whether a duty to consult arose and was or was not met. However, I must consider and be informed by the current status of Aboriginal and treaty rights to fish, as discussed in Chapter 3, Legal framework.

Ms. McGivney, former regional director of Treaty and Aboriginal Policy and Governance Directorate, Pacific Region, told me that DFO is aware that its fisheries management actions have the potential to infringe on Aboriginal rights.⁹⁰⁵ However, I was also told that DFO holds no mandate to determine whether an Aboriginal group holds an Aboriginal or treaty right to fish, nor does DFO have any mandate to assess the nature or scope of such right.⁹⁰⁶ When Aboriginal rights claims arise, DFO does not have any process to assess them. Instead, it takes the position that questions related to the scope and extent of Aboriginal rights are to be resolved through the treaty process or through litigation.⁹⁰⁷ Ms. McGivney acknowledged that treaty negotiators and courts have yet to resolve Aboriginal rights claims, creating challenges for DFO in managing the Fraser River sockeye salmon fishery.⁹⁰⁸

Instead of determining what Aboriginal fishing rights are held by whom, DFO manages Aboriginal participation in the fishery by using a policy-based approach and by offering programs to support Aboriginal participation in the fishery and in fisheries management.⁹⁰⁹ These policies and programs are described below.

Aboriginal fishing policies and programs

DFO has a long history of managing Aboriginal participation in the Fraser River sockeye salmon fishery, as described in Chapter 1, Commission's

mandate. Many of DFO's current programs follow the Aboriginal Fisheries Strategy (AFS), introduced in 1992 to provide for the management of the fishery in a manner consistent with the minister's conservation responsibilities and with the Supreme Court of Canada's 1990 decision in *R. v. Sparrow*.⁹¹⁰

Aboriginal Fisheries Strategy

The Aboriginal Fisheries Strategy is a national program that involves the negotiation of time-limited fisheries agreements (AFS agreements) between Aboriginal organizations and DFO regarding fisheries allocations and conditions attached to Aboriginal communal fishing licences. In addition to addressing allocations for food, social, and ceremonial (FSC) fishing purposes, AFS agreements may provide commercial fishing access, as discussed below. Also, AFS agreements may provide funding for participation in fisheries management or other projects. These agreements expressly do not recognize an Aboriginal or treaty right to fish and are made without prejudice to the positions taken by any party with respect to such rights.⁹¹¹

An Aboriginal group is eligible to enter into AFS agreements if it represents an identifiable community base, has a history of fishing, is presently active in fishing, and has a governance structure in place that represents its membership in the negotiation of the particular AFS agreement.⁹¹² To receive AFS funding between 1993 and 1999, Aboriginal groups were also required to sign onto the 1993 Fraser Watershed Agreement, as described below in the section describing the history of DFO's co-management efforts.⁹¹³

In 1992, DFO announced the AFS as a seven-year, \$140 million, national program with 70 percent of the funds to be spent in British Columbia.⁹¹⁴ At the time, DFO hoped that the AFS would serve as a bridging arrangement in fisheries matters during the negotiation of land claims and self-governance agreements, such as treaties, which Canada anticipated would be completed within a decade.⁹¹⁵ As described later in this Report, treaty negotiations have not yielded agreements as quickly as originally hoped. The AFS is now a permanent program.⁹¹⁶ From 1992 to 2010, AFS agreements provided a total of \$303,884,982 to Aboriginal organizations in the Pacific Region to fund a variety of activities.⁹¹⁷ For example, in

the 2009/10 fiscal year, Pacific Region Aboriginal organizations received approximately \$14.4 million in AFS funds for co-management activities.⁹¹⁸

Policy for the Management of Aboriginal Fishing

In 1993, DFO created its national Policy for the Management of Aboriginal Fishing, to guide the implementation of the AFS.⁹¹⁹ It defines Aboriginal fishing* as fishing under the authority of a communal licence issued pursuant to the *Aboriginal Communal Fishing Licences Regulations*, whether for FSC purposes or for sale.⁹²⁰ The Policy for the Management of Aboriginal Fishing applies to all species of fish and covers a broad range of Aboriginal fishing topics.

As discussed above, DFO takes a policy-based approach to managing the Aboriginal fishery.⁹²¹ The Policy for the Management of Aboriginal Fishing sets out many of DFO's core policy principles, such as limiting Aboriginal communal fishing to an Aboriginal group's historical fishing areas, issuing communal rather than individual fishing licences, providing Aboriginal groups with priority access for FSC fishing, and consulting with Aboriginal groups regarding fisheries allocations, whether they have entered into a treaty or obtained a determination of an Aboriginal FSC fishing right in court.⁹²² This policy remains in effect.

Allocation Transfer Program

In 1994, DFO introduced the Allocation Transfer Program (ATP) as part of the AFS.⁹²³ According to DFO, the goal of the ATP is to increase Aboriginal access to commercial fisheries and to support fisheries-based economic development for coastal First Nations.⁹²⁴ The ATP acquires commercial fishing access for Aboriginal groups by purchasing commercial fishing licences from commercial fishers on a voluntary basis. The fishing licences are then permanently retired from the general commercial fishing fleet, and an equivalent commercial fishing capacity (licence or allocation) is issued to

Aboriginal organizations under AFS agreements.⁹²⁵ ATP funds may also be used to pay for fishing gear, equipment, commercial fishing vessels, and other related costs.⁹²⁶

When DFO announced the ATP in 1994, it was presented as a national six-year program with \$42 million in funding over six years.⁹²⁷ The ATP was later extended and provided with relatively stable funding, including \$4 million to \$6 million in ATP funds to the Pacific Region each year.⁹²⁸ For example, in the 2009/10 fiscal year, approximately \$5.4 million in ATP funds were used for Pacific Region Aboriginal groups to acquire fishing equipment and commercial fishing access across a range of species.⁹²⁹ With respect to salmon, DFO spent \$19,115,103 in ATP funds between 1994 and 2011 to purchase commercial Pacific salmon access (licences and quota) for transfer to Aboriginal organizations.⁹³⁰ DFO spent an additional \$2,124,579 to purchase commercial Pacific salmon fisheries access in pre-ATP programs from 1992 to 1994.⁹³¹

Aboriginal Aquatic Resources and Oceans Management Program

In 2004, DFO introduced the Aboriginal Aquatic Resources and Oceans Management Program (AAROM) as a national contribution funding program with three areas of focus: co-management, capacity building, and economic opportunities for First Nations.⁹³² The co-management component of AAROM pays for the creation of Aboriginal fisheries organizations formed by multiple Aboriginal groups working together. These groups, referred to as AAROM bodies, allow First Nations to share administrative and communications capacity and to engage shared biologists, technicians, and fisheries advisors.⁹³³ DFO intends that AAROM bodies will facilitate Aboriginal participation in DFO advisory and decision-making processes, but these aggregate groups are not expected to replace existing relationships between the department and individual First Nations.⁹³⁴ The capacity-building component of AAROM provides funding to groups that have not formed an AAROM body

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures* (Bill C-38), received royal assent. Part 3, Division 5, of Bill C-38 amends the *Fisheries Act*, including a new definition for "Aboriginal" in the context of fisheries: "Aboriginal", in relation to a fishery, means that fish is harvested by an Aboriginal organization or any of its members for the purpose of using the fish as food or for subsistence or for social or ceremonial purposes" (s. 133).

but are interested in working together with other Aboriginal organizations. These funds may be used to pay for meetings among Aboriginal groups, develop business practices, and pay for administrative, financial, and legal preparations for the establishment of an AAROM body.⁹³⁵ The economic opportunities component of AAROM funds the acquisition of commercial fisheries access for AAROM bodies and the development of Aboriginal aquaculture-related activities.⁹³⁶

When DFO announced AAROM in 2004, it was presented as a five-year contribution program. However, it has since been extended to March 31, 2014.⁹³⁷ In the Pacific Region, between \$6 million and \$7 million are spent on AAROM funding each year.⁹³⁸ Between 2004 and 2010, \$28,586,433 in AAROM funds were distributed to Aboriginal organizations in British Columbia, several of which* participated in this Inquiry.⁹³⁹ Also, between 2004 and 2006, \$3,291,200 in AAROM funds were used in the acquisition of commercial Pacific salmon fisheries access for Aboriginal organizations.⁹⁴⁰

Integrated Aboriginal Policy Framework

DFO's 2006–10 national Integrated Aboriginal Policy Framework (IAPF) sets out seven action plan strategies for the department:

- building and supporting strong, stable relationships with Aboriginal people;
- taking into account Aboriginal and treaty rights by carrying out DFO's mandate in a manner consistent with constitutional principles;
- participating in the negotiation of land claims agreements as part of the processes led by Indian and Northern Affairs Canada;
- supporting increased Aboriginal participation in co-management of aquatic resources;
- providing for increased Aboriginal participation in integrated commercial fisheries and other economic opportunities;
- building Aboriginal capacity to participate in the aquatic sector; and
- building DFO's capacity to serve Aboriginal groups.⁹⁴¹

DFO says the IAPF will guide its employees in discussions with federal agencies, provinces, territories, stakeholders, and Aboriginal groups and provide employees with strategic policy direction for the development of operational guidelines and programs.⁹⁴² The IAPF does not replace the Policy for the Management of Aboriginal Fishing. The definition of co-management contained in the IAPF is discussed below in the section on co-management.

Pacific Integrated Commercial Fisheries Initiative

In 2007, DFO introduced the Pacific Integrated Commercial Fisheries Initiative (PICFI), a five-year \$175 million initiative to “support the long-term economic viability of BC commercial fisheries and the sustainability of fisheries resources.”⁹⁴³ PICFI objectives include “lay[ing] the foundation for all industry participants, First Nation and non-First Nation, to work together on harvest strategies to maximize the value of commercial fisheries” and “provid[ing] greater certainty around the participation of BC First Nations in the commercial fishery, while supporting sustainable First Nation communities and greater economic self-sufficiency.”⁹⁴⁴ According to DFO, PICFI also supports conservation objectives by increasing catch monitoring and reporting for all resource users and by supporting the enforcement activities of DFO's Conservation and Protection Branch (see discussion in Chapter 7, Enforcement).⁹⁴⁵

PICFI is structured around four “elements,” with funding distributed among them over five years as follows:

- 1 increased First Nations' access to commercial fisheries – \$115 million
- 2 capacity building – \$12.5 million
- 3 co-management – \$11 million
- 4 enhanced accountability – \$10.5 million⁹⁴⁶

The commercial access component of PICFI pays for the acquisition of commercial fishing licences, quota, vessels, and gear from the general commercial fishery in order to support Aboriginal commercial fisheries enterprises.⁹⁴⁷ A maximum of 15 percent of PICFI licence relinquishment funding is applied to

* For example, the Upper Fraser Fisheries Conservation Alliance, the First Nations Fisheries Council, and the Aboriginal Caucus of the Fraser River Aboriginal Fisheries Society.

salmon access, with the remainder of funds used for other coastal fisheries.⁹⁴⁸ The capacity-building component of PICFI pays for the creation of Aboriginal commercial fisheries enterprises and for training and business planning.⁹⁴⁹ The co-management component of PICFI pays for Aboriginal participation in fisheries management processes and for work on developing new governance models and share-based management.⁹⁵⁰ The enhanced accountability component of PICFI pays for increased fisheries monitoring and catch reporting, compliance monitoring, and the development of a harvest traceability framework. (For further information, see Chapter 7, Enforcement, and the previous section of this chapter on catch monitoring and reporting.)

As described above, PICFI is a five-year, \$175 million initiative. From 2007 to 2010, PICFI funds were distributed to Aboriginal organizations through AFS agreements (\$303,104),* PICFI agreements (\$249,700), and AAROM agreements (\$1,266,807).⁹⁵¹ In addition, from 2007 to 2011, \$14,674,685 in PICFI funds were used to acquire commercial Pacific salmon fisheries access for Aboriginal organizations.⁹⁵² At the time of the hearings in September 2011, PICFI was set to expire on March 31, 2012.[†]

Aboriginal Fisheries Framework

DFO’s 2009 Aboriginal Fisheries Framework is a brief document that, according to DFO, is intended to provide “a more coherent, policy-based approach to addressing Aboriginal participation in BC fisheries and managing *Charter* section 35 rights, both inside and outside of treaty.”⁹⁵³ In drafting the framework, DFO recognized that “the negotiation and implementation of First Nation fishing arrangements in BC treaties have become increasingly challenging” and that it needed to explore options that are “significantly different from the current approach to treaty negotiation in BC.”⁹⁵⁴ These options may include (a) negotiation of fisheries treaties or agreements with First Nations aggregates, independent of other treaty elements, and (b) non-treaty alternatives such as enhancing current Aboriginal fishing programs, declaring overall First

Nations shares for salmon by major watershed, and developing sharing arrangements and integrated management processes with First Nations.⁹⁵⁵

The Aboriginal Fisheries Framework sets out overarching principles for Aboriginal fisheries management, many of which originate from previous policies.⁹⁵⁶ Significantly, it also contains an undisclosed percentage representing the overall proportion of the available salmon harvest to be allocated to First Nations for both FSC and economic fishing purposes.⁹⁵⁷ However, the clerk of the privy council certified this percentage allocation and related information as a cabinet confidence and, as a result, DFO could not provide it to me.

DFO’s budget for Aboriginal fisheries programs

As described in Chapter 4, DFO overview, Pacific Region Aboriginal fisheries policies and programs are implemented by the Treaty and Aboriginal Policy and Governance Directorate (TAPG Directorate).⁹⁵⁸ In the 2009/10 fiscal year, the TAPG Directorate spent approximately \$56.7 million, down from approximately \$58 million the year before.⁹⁵⁹ In comparison, in 2009/10, DFO’s Pacific Region Conservation and Protection Branch spent \$20.6 million, Pacific Region Resource Management spent \$20.4 million, and Pacific Region DFO spent \$1.1 million on environmental assessments.⁹⁶⁰

Of the \$56.7 million spent by the TAPG Directorate, \$2.6 million was used for DFO salaries and \$1.9 million was spent on internal operating expenses.⁹⁶¹ The remaining \$52.1 million was distributed to Aboriginal organizations as follows:

\$6.2 million	Aboriginal Aquatic Resource and Ocean Management Program (AAROM)
\$1.4 million	AAROM and Pacific Integrated Commercial Fisheries Initiative (PICFI)
\$14.4 million	Aboriginal Fisheries Strategy (AFS) – Co-management
\$5.4 million	Allocation Transfer Program (ATP)

* This amount is included in the value given for total AFS agreement funds described earlier.
† I note that in the budget tabled in Parliament on March 29, 2012, the government proposes to provide “\$33.5 million in 2012-13 to extend the Atlantic Integrated Commercial Fisheries Initiative and the Pacific Integrated Commercial Fisheries Initiative.”

\$21.5 million	PICFI – Acquisition of Fisheries Access*
\$3.2 million	PICFI – Other ⁹⁶²

In fiscal years 1992–2010, the total value of AFS funding agreements entered into with Aboriginal organizations in DFO's Pacific Region was \$303,884,982.⁹⁶³ In addition, \$28,586,433 in AAROM funds were distributed from 2004 to 2010, and from 1992 to 2009, a total of \$36,706,162 in ATP,[†] AAROM, and PICFI funds were used to acquire commercial Pacific salmon fisheries access for Aboriginal organizations.⁹⁶⁴

I heard from DFO and Aboriginal witnesses that DFO's internal capacity to manage Aboriginal fisheries is strained. Mr. Shepert, chair of the Upper Fraser Fisheries Conservation Alliance, told me that DFO staff are “spread thin” and that it is sometimes difficult to get the right people to the negotiation table.⁹⁶⁵ Mr. Huber, Aboriginal affairs advisor, BC Interior, DFO, put it this way: “Our department, I would say, is facing more challenges in many cases than the First Nations, as we have a lot of staff that need capacity built as well.”⁹⁶⁶

DFO's management of food, social, and ceremonial fisheries

My Terms of Reference direct me to develop recommendations for improving the future sustainability of the Fraser River sockeye salmon fishery. I begin by considering those aspects of DFO's management of Aboriginal food, social, and ceremonial fishing that relate to the sustainability of the Fraser River sockeye salmon fishery as a whole.

Lack of definition for FSC fishing

DFO has no specific definition for the term “food, social, and ceremonial” fishing except that fish harvested for such purposes cannot be sold.⁹⁶⁷ Ms. McGivney agreed that there is no clarity on what this term means.⁹⁶⁸ As discussed below, this lack of definition has led to Aboriginal and non-Aboriginal concerns about the appropriate quantification of FSC fishing allocations, which

enjoy a priority of access over commercial and recreational fisheries.

Aboriginal witnesses offered some guidance as to their understanding of the meaning of FSC fishing. In relation to food, Chief William Charlie of the Chehalis Indian Band explained that salmon is the main diet of his people.⁹⁶⁹ Chief Kimberley Baird of the Tsawwassen First Nation similarly said that salmon has been the mainstay of the Tsawwassen diet for “all of living memory,” and Joseph Becker of the Musqueam First Nation explained that salmon is required to meet the food needs of elders and people with disabilities.⁹⁷⁰ A lack of salmon for food has been particularly troubling for Councillor June Quipp of the Cheam Indian Band, who sees the impact of such loss on “people in her community who live in poverty” and who rely on fish to avoid starvation.⁹⁷¹

Several witnesses also offered their views on the definition of “social” fishing. Grand Chief Clarence Pennier of the Stó:lō Tribal Council said that the Stó:lō peoples conduct a dry-rack fishery for both food and cultural purposes.⁹⁷² Chief Fred Sampson of the Siska First Nation (Nlha7apmx Nation) explained that food is only part of the story; “the community's social needs are also critical.”⁹⁷³ Grand Chief Saul Terry of the St'at'imc Nation explained that the cultural aspect of fishing is a “profound thing” that reaches beyond simply catching fish for food to include all the practices surrounding such activity.⁹⁷⁴ For the Cheam fishers, that includes sharing a fishing lifestyle, taking pride in feeding salmon to guests visiting their territory, and caring for elders.⁹⁷⁵ The Stó:lō peoples, among other groups, teach the importance of feeding guests at social functions – and the menu includes salmon.⁹⁷⁶ The act of fishing itself may also be considered a social activity. Chief Baird said that Tsawwassen fishers want to participate and be on the river, whether one fish or a hundred are caught.⁹⁷⁷ Captain Gary Ducommun of the Métis Nation of British Columbia similarly said that “fishing is a social practice for Métis people.”⁹⁷⁸ Members of the Laich-kwiltach Treaty Society consider it important to have whole families engaged in fishing, allowing youth and elders to spend time together every year.⁹⁷⁹ DFO has no clear definition of “social,” and there has

* This value is not exclusively salmon access.

† This total includes funds preceding the ATP, beginning in 1992. See Exhibit 1430.

been a long-standing disagreement between First Nations and DFO on this point.⁹⁸⁰ Despite this lack of agreement, Ms. McGivney acknowledged that she has not specifically worked with indigenous peoples on reaching an agreed definition of social fishing.⁹⁸¹

According to Ms. McGivney, DFO views ceremonial fishing as including fishing for weddings, funerals, births, and celebrations around those events.⁹⁸² However, DFO area office staff members have expressed concerns about elevating levels of ceremonial catch in the Lower Fraser River area, and they have noted a lack of guidance on how to respond. A June 2009 email from a resource management director to Aboriginal fisheries managers observes:

DFO staff are concerned about escalating levels of ceremonial catch in the Lower Fraser. There is a growing number of requests to fish for ceremonial purposes during the week when there is communal fishing during the weekend. There are no guidelines on what should be considered appropriate criteria / circumstances for ceremonial harvest.⁹⁸³

First Nations have offered various views on the definition of “ceremonial” uses for fish. Chief Edwin Newman of the Heiltsuk Nation stated that salmon has an important place in the Heiltsuk potlatch ceremony, and Grand Chief Pennier stated that the Stó:lō require salmon for an annual “first salmon ceremony” in addition to memorials, weddings, winter dances, naming ceremonies, births, and womanhood and manhood ceremonies.⁹⁸⁴ Chief Charlie offered a more inclusive definition, which, in addition to winter, wedding, life, death, change of life, and naming ceremonies, would include other gatherings with a “spiritual purpose,” because “one cannot define what a ceremony is.”⁹⁸⁵

Despite the absence of a clear definition for food, social, and ceremonial fishing, Mr. Rosenberger told me that DFO tries to arrive at FSC allocations that reflect the genuine food, social, and ceremonial needs of Aboriginal communities.⁹⁸⁶ It attempts to do so through negotiations between its resource managers and representatives

from Aboriginal groups.⁹⁸⁷ DFO provides its resource managers with a “mandate” or maximum number of FSC sockeye that may be included in an AFS agreement as well as with “guiding principles” related to managing FSC fisheries.⁹⁸⁸

To inform negotiations on FSC allocation, DFO considers a number of factors.⁹⁸⁹ The 1993 Policy for the Management of Aboriginal Fishing lists these factors as including the group’s population, recent FSC harvests, harvest preferences, and the availability of fish species in the area.⁹⁹⁰ Ms. McGivney said the First Nation’s interests in a fish species, the breadth of species available, access of other First Nations to the species, and the status of fish resources are further considerations.⁹⁹¹ In quantifying FSC allocations, DFO may consider whether past FSC fish harvests have been sold, but during Ms. McGivney’s time as regional director of the Treaty and Aboriginal Policy and Governance Directorate, DFO has never reduced an FSC allocation on that basis.⁹⁹² The factors applied by DFO in determining FSC allocations are publicly available information,^{*} and it appears that some Aboriginal groups are aware of them. The *BC First Nations Fisheries Action Plan*, a report prepared in 2007 by the BC First Nations Leadership Council,[†] advises First Nations to “increase food, social and ceremonial use to increase baseline calculations used by governments in developing their [FSC allocation] mandates.”⁹⁹³

Where negotiations fail to produce an agreement on the quantity of fish to be taken and the conditions under which a group may fish for FSC purposes, DFO’s policy is to issue a communal licence to the group in any event, with an FSC allocation as determined by DFO.⁹⁹⁴ Once an overall FSC allocation is determined, it is up to the Aboriginal group to manage its use of the fish and to set aside fish as necessary to meet its various food, social, and ceremonial needs.⁹⁹⁵ During the fishing season, an Aboriginal group may request a change to its FSC allocation, and the request will be considered by DFO according to an evaluation and decision framework it developed to assist fisheries managers to respond to such requests.⁹⁹⁶

I heard many concerns regarding DFO’s current method of determining FSC allocations. Several Aboriginal witnesses felt that the allocated numbers

* For example, the 1993 Policy for the Management of Aboriginal Fishing is available on the DFO website.

† Consisting of the BC Assembly of First Nations, the First Nations Summit, and the Union of BC Indian Chiefs.

were arbitrary.⁹⁹⁷ Chief Robert Mountain of the Namgis First Nation did not see any relationship among the allocated number, the need for conservation, and the food fishery needs expressed by his Aboriginal group.⁹⁹⁸ Chief Baird also said that the allocation “ceiling” was arbitrary and stated that First Nations lack clarity on how they are arrived at.⁹⁹⁹ Further, Heiltsuk fisheries advisor Ross Wilson said he did not know where the 20,000 sockeye allocation for Heiltsuk came from.¹⁰⁰⁰ Chief Newman testified that the Heiltsuk did not want DFO or anyone outside to number their FSC needs; rather, they wanted to determine that number.¹⁰⁰¹ In fact, the Heiltsuk have produced a study to determine the needs of their people, including the number of sockeye required to meet their “basic food and feasting requirements.”¹⁰⁰² Similarly, Grand Chief Terry testified that an FSC need is something that groups “have to determine for [themselves].”¹⁰⁰³

Mr. Rosenberger testified that, although some First Nations have supported their FSC allocation requests with documentation, others have requested a fixed number without such support.¹⁰⁰⁴ Ms. McGivney said that First Nations often have not quantified their needs.¹⁰⁰⁵ Mr. Shepert was not aware of any Upper Fraser Aboriginal group that had determined what their food requirements were.¹⁰⁰⁶ Some witnesses expressed reluctance to be tied to any number. For example, Councillor Quipp testified that her “indicator ... as to whether we’ve filled an allocation that we need, or that the needs of our people are being filled, is if we don’t hear any more complaints about one of our members getting enough salmon for the year.”¹⁰⁰⁷ Similarly, Grand Chief Terry said: “We don’t go to DFO a lot of times to be able to calculate these matters. The need is there ... our folks, when they go fishing, they are the ones that determine what it is that they’re going to need for the winter in their calculation.”¹⁰⁰⁸

In 2009, DFO allocated a total of 1,029,650 Fraser River sockeye salmon for harvest in Aboriginal FSC fisheries as follows: 260,050 to South Coast area groups, 437,000 to Lower Fraser area groups, and 332,600 to groups in the BC Interior area.¹⁰⁰⁹ Allocations for FSC purposes, in general, remain fairly static.¹⁰¹⁰ A 2006 presentation to DFO’s Regional Management Committee from the Treaty and Aboriginal Policy and Governance Directorate noted that there had been “no global or strategic review of FSC allocations

since they were first established under [the] AFS in 1992.”¹⁰¹¹ Although agreeing that the global allocation had remained consistent, Mr. Rosenberger told me that a few groups have had substantial changes to their allocations.¹⁰¹²

The sufficiency of allocations appears to be of broad concern for First Nations. Several Aboriginal witnesses testified to their desire for increased FSC fishing allocations. Mr. Wilson told me that the Heiltsuk requested an increase of 5,000 sockeye to their allocation in 2011, and a DFO memorandum indicates that First Nations throughout the South Coast area have said that their FSC allocations for salmon do not meet their needs.¹⁰¹³ In 2004, the First Nations Panel on Fisheries recommended in *Our Place at the Table: First Nations in the BC Fishery* that Canada take immediate steps to allocate to First Nations a minimum 50 percent share of all fisheries, with the understanding that this proportion may reach 100 percent in some fisheries.¹⁰¹⁴ Similarly, the 2007 First Nations Fisheries Action Plan states as an action item that “First Nations will develop a political, public relations and inter-governmental strategy to achieve a First Nations majority share of all fisheries resources, based on Aboriginal priority rights to the fishery.”¹⁰¹⁵ I note that the First Nations Panel on Fisheries and the *BC First Nations Fisheries Action Plan* recommendations were not limited to FSC allocations but are indicative of the desire for a greater Aboriginal share in the fisheries generally.

I also heard concerns that FSC allocations for Fraser River sockeye may be inconsistent among Aboriginal groups. A DFO memorandum to the regional director general in 2005 noted that “the combined allocation to the 21 First Nations on southeast Vancouver Island results in an average of 10 sockeye per person, but ranges from 5 to 22 per person on a band by band basis.”¹⁰¹⁶ There are also inconsistent allocations among the Lower Fraser and Upper Fraser groups situated on the migratory path of Fraser River sockeye. For example, in the Lower Fraser in 2009, the Musqueam First Nation was allocated an average of 61 sockeye per person, while the Squamish First Nation was allocated five sockeye per person.¹⁰¹⁷ In the BC Interior in 2009, the High Bar First Nation (north of Kamloops) was allocated an average of 110 sockeye per person, while the Kluskus First Nation (near Quesnel) was allocated only seven sockeye per person.¹⁰¹⁸

The concern over potentially inconsistent allocations appears to have been present for some time. In 1987, before the introduction of pilot sales fisheries, a DFO memorandum noted that the Stó:lō caught roughly 600 pounds (272 kg) of sockeye per person, whereas the Carrier Sekani caught 50 pounds (22.6 kg) per person.¹⁰¹⁹ An internal DFO presentation dated 2006 indicates that DFO is aware of the existence of FSC allocation disparities. It states that fisheries managers are often asked to expand FSC fishing allocations and access “without an analytical framework or clear administrative framework” and that this gap “has lead to ad-hoc decisions, confusion, disparities among [First Nations], and inconsistencies between AFS and treaties.”¹⁰²⁰ In a written response to an information request from Commission counsel, DFO, through its counsel the Department of Justice, explained that “the FSC allocation per capita can be highly variable” because “population size is only one factor that would inform an appropriate FSC allocation.”¹⁰²¹ DFO would not “impose equal per capita allocations but would consider the approach if proposed collectively by all affected First Nations.”¹⁰²²

I also heard concerns that some FSC allocations may be too high. For example, in 2002, the Kwantlen First Nation harvested 39,249 FSC Fraser River sockeye for a population of 173 people, or over 226 sockeye salmon per person.¹⁰²³ This total is in addition to the 1,035 chinook, 21 steelhead, 224 coho, and 1,504 chum harvested by this group, for a total of 42,033 fish, or almost 243 fish per person harvested for food, social, and ceremonial consumption.¹⁰²⁴ Mr. Crey, of the Stó:lō Tribal Council, acknowledged that “on the face of it, it looks like a lot of fish,” but he explained that, though fish are used for food, they are also shared more broadly, and the harvest should not be considered simply on a per person basis.¹⁰²⁵

Allocating FSC fisheries access in a transparent manner

As described above, DFO seeks to allocate fisheries access to Aboriginal organizations through a process of negotiation.¹⁰²⁶ It provides its negotiators with confidential mandates setting out the maximum number of fish and funding they may agree to with First Nations.¹⁰²⁷ These mandates are the “long-term upper limit for allocations,” and

DFO has developed a mandate for each Aboriginal group holding a communal licence to participate in the Fraser River sockeye fishery.¹⁰²⁸ Mandate numbers are not disclosed to Aboriginal groups or to the public.¹⁰²⁹ However, a 2006 internal review of fisheries mandates found that the majority of First Nations communal fishing licences already reflect maximum mandate levels.¹⁰³⁰

In addition to setting existing mandates, I heard that, around 2008, DFO began to examine how future Aboriginal and non-Aboriginal fisheries allocations might compare following the completion of treaties.¹⁰³¹ This project was called the Coastwide Framework, and it was intended to address public concerns that fisheries allocations made to First Nations under treaties might not leave sufficient allocation room to support non-Aboriginal fisheries.¹⁰³² The Coastwide Framework was developed over a number of years and involved the creation of thousands of documents shared among the most senior officials at DFO.¹⁰³³ This process led to the creation of the Aboriginal Fisheries Framework (discussed above), which received ministerial approval in the fall of 2009.¹⁰³⁴ However, the finalization of the Coastwide Framework was deferred pending the findings and recommendations of this Inquiry.¹⁰³⁵

The Aboriginal Fisheries Framework represents the culmination of work under the Coastwide Framework process and captures the current status of DFO’s policies on Aboriginal fisheries.¹⁰³⁶ Like other DFO framework documents, it sets out an overarching approach to Aboriginal fisheries and lists key principles, but it does not provide specific direction on its application or implementation.¹⁰³⁷ Many of these principles have appeared in previous policies.¹⁰³⁸ Perhaps the most substantial development in the Aboriginal Fisheries Framework is the articulation of an overall percentage of the available salmon harvest to be allocated to First Nations for both FSC and economic opportunity fisheries.¹⁰³⁹ The actual percentage was not provided to the Commission because, as I explained above, the clerk of the privy council certified the percentage allocation and related information as a cabinet confidence. However, DFO confirmed that the FSC component of this allocation will, for the purpose of treaties, include a negotiated one-time increase over current FSC fishing levels to account for future population growth.¹⁰⁴⁰

DFO has not specifically consulted with First Nations or others on its development of the Aboriginal Fisheries Framework, on the concept of an overall salmon allocation for First Nations, or on the actual salmon allocation itself.¹⁰⁴¹ Instead, Ms. McGivney told me that DFO created the Aboriginal Fisheries Framework based on information from previous consultations with First Nations, from documents such as *Our Place at the Table* and the *BC First Nations Fisheries Action Plan*, and from previous discussions with commercial and recreational fishers.¹⁰⁴²

Although neither I nor the public are privy to the overall percentage of salmon allocated to First Nations in the Aboriginal Fisheries Framework, I have learned through this Inquiry some of the ways in which it is applied. According to Ms. McGivney, the percentage allocation covers both FSC fishing and Aboriginal communal fishing for economic purposes.¹⁰⁴³ The percentage allocation is to be achieved over a number of years, on average, recognizing that in years of low salmon returns, the FSC fishery may form a higher percentage of catch.¹⁰⁴⁴ Although the overall salmon allocation percentage is not currently used to set negotiation mandates, any changes to existing mandates must be consistent with this percentage.¹⁰⁴⁵ The ATP and PICFI commercial access programs are guided by this percentage; treaty negotiations, when they occur, take this percentage into account; and any new programs or provision of economic opportunity fisheries, including a move to terminal fisheries, must also be consistent with this percentage.¹⁰⁴⁶

FSC fisheries access in years of low abundance

DFO policies such as the 1993 Policy for the Management of Aboriginal Fishing, the 1999 Allocation Policy for Pacific Salmon, and the 2005 Wild Salmon Policy all state that the first priority of access to fish after conservation is to Aboriginal people for FSC purposes.¹⁰⁴⁷ As described in Chapter 3, Legal framework, the priority of access for FSC fishing originates from the Supreme Court of Canada's decision in *R. v. Sparrow*. Without making any determination on whether DFO has met its obligation to grant priority of access to FSC fisheries,

I note that, in years of low abundance of Fraser River sockeye, the majority of these fish were harvested by Aboriginal fishers. For example, nearly 100 percent of Fraser River sockeye returns were harvested in FSC fisheries in 2009 and 2007, over 90 percent in 2008, and over 80 percent in 2005 and 1999.¹⁰⁴⁸

Nevertheless, I heard that many Aboriginal groups experience difficulty in harvesting their FSC allocations. Mr. Huber told me that the poor returns of certain fish stocks meant that many First Nations have not met their FSC allocations for some time.¹⁰⁴⁹ Chief Newman advised that the Heiltsuk have not caught their FSC allocation for "a number of years" because the fish aren't there or else have passed Heiltsuk fishing areas before anyone realized they were there.¹⁰⁵⁰ Mr. Shepert told me that most of the Aboriginal groups north of Williams Lake had not received their FSC fish and that, for the 15 years he has been working on fisheries matters, he has never seen First Nations in the Upper Fraser obtain the number of fish they need.¹⁰⁵¹ The year 2009 was especially difficult. The 2010 southern salmon Integrated Fisheries Management Plan post-season review notes that, due to low returns in 2009,* the total First Nations FSC harvest was only 61,429 sockeye in the Fraser River watershed and 10,144 Fraser River sockeye in the marine waters, totaling a small fraction of the 1,029,650 Fraser River sockeye allocated for FSC fisheries that year.¹⁰⁵² This evidence emphasizes the importance of conservation, to ensure that sufficient numbers of fish return to meet FSC fishing and other purposes.

DFO's management of Aboriginal economic opportunity fisheries

I turn now to the department's policies and practices surrounding the Aboriginal economic opportunity fishery. In particular, I consider how they may affect the future sustainability of the Fraser River sockeye salmon fishery as a whole.

DFO's programs to support Aboriginal economic opportunity fishing

As described in Chapter 1, Commission's mandate, Aboriginal fishers participate in the

* In 2009, there were no commercial fisheries openings for Fraser River sockeye salmon.

general commercial fishery on an individual basis. In addition, several DFO programs seek to provide Aboriginal groups with communal access to economic fisheries. In 1992, DFO initiated the Pilot Sales Program to provide Aboriginal groups with economic access to fisheries in three locations: the Lower Fraser River, the Skeena River, and the Alberni Inlet-Somass River.¹⁰⁵³ In the Lower Fraser River, DFO authorized pilot sales fisheries under AFS agreements and communal fishing licences issued to the Stó:lō, Musqueam, and Tsawwassen nations.¹⁰⁵⁴ Between 1992 and 2003, pilot sales agreements set out a single allocation of fish that combined both FSC and economic fishing access: First Nations could decide how much of the allocation they wished to sell.¹⁰⁵⁵

The Pilot Sales Program was suspended in 2003 and replaced the following year by communal “economic opportunity fisheries.”¹⁰⁵⁶ Economic opportunity fisheries differ from pilot sales in that they clearly separate fishing allocations for economic purposes from allocations for FSC purposes.¹⁰⁵⁷ According to Ms. McGivney, the idea was to provide a “level playing field” and have a “fishery that’s of the same priority for all of the groups” involved.¹⁰⁵⁸ It is currently DFO’s policy not to provide any priority for Aboriginal economic opportunity fisheries unless such a right has been proven in court.¹⁰⁵⁹ However, there are several differences in fisheries management between the general commercial fishery and the Aboriginal economic opportunity fishery. For example, the management of economic opportunity fisheries does not fall under the authority of the Fraser River Panel, and DFO does not, to Ms. McGivney’s knowledge, enter into comprehensive fisheries agreements or monitoring and enforcement protocols with general commercial fishers.¹⁰⁶⁰

According to DFO, economic fishing access is provided to First Nations through the voluntary relinquishment of equivalent access from the general commercial fishery.¹⁰⁶¹ DFO programs to acquire fisheries access from the general commercial fishery include the ATP, AAROM, and PICFI, as described above. These programs have invested significant funds in acquiring access for First Nations to commercial Pacific salmon fisheries:

- ATP: \$19,115,103 from 1994 to 2011 and \$2,124,579 in pre-ATP funds from 1992 to 1994.

- AAROM: \$3,291,200 from 2004 to 2006.
- PICFI: \$14,674,685 from 2007 to 2011.¹⁰⁶²

As of January 2011, DFO had spent \$39,205,567 to acquire commercial salmon fishing access for Aboriginal organizations in the Pacific Region.¹⁰⁶³ As of August 2011, 21.7 percent of Pacific salmon seine licences, 17.5 percent of salmon gillnet licences, and 11.0 percent of salmon troll licences were held in the Aboriginal communal commercial fishery.¹⁰⁶⁴ Including other species as well as gear and vessel acquisition, DFO has spent approximately \$210 million since 1994 to provide Pacific Region First Nations with commercial fishing access.¹⁰⁶⁵ According to the First Nations Fisheries Council, PICFI has facilitated the creation of 25 Aboriginal commercial fishing enterprises in British Columbia, and each of these businesses has received between \$4 million and \$7 million in commercial licences and quota acquisition.¹⁰⁶⁶ However, a First Nations Fisheries Council report suggests that “a larger base of licenses and quota is needed to ensure widespread success for First Nations seafood businesses.”¹⁰⁶⁷

According to DFO, programs such as ATP and PICFI are “important components of Canada’s economic development programming for First Nations.”¹⁰⁶⁸ Chief Sampson told me that economic fisheries in his area provide “opportunities to those who are often the poorest of the poor in this province” and that benefits from such fisheries are significant.¹⁰⁶⁹ However, I also heard some witnesses prioritize their conservation and FSC fishery concerns over increasing economic benefit. Mr. Huber testified that, for several years after PICFI started, “there just wasn’t fish available” for harvest, and it was difficult for many First Nations in the BC interior to consider the development of economic fisheries in their region “when they felt their own food fisheries, traditional fisheries, were being threatened.”¹⁰⁷⁰ Other witnesses noted that achieving healthy fish stocks is a prerequisite to commercial fishing success. For example, Chief Sampson told me that “a viable commercial fishery can only happen when the stocks are able to sustain themselves again.”¹⁰⁷¹ Julie Stewart, director of PICFI, said that the economic fisheries would be successful only if fish return in sufficient numbers to support them.¹⁰⁷²

As described above, PICFI was announced in 2007 as a five-year, \$175 million program. It is currently the largest program in British Columbia for increasing Aboriginal access to commercial fisheries. Several Aboriginal witnesses and participant groups suggested that DFO should renew PICFI to continue transferring commercial fisheries access to First Nations. Chief Russ Jones, a hereditary chief of the Haida Nation, a member of the First Nations Panel on Fisheries,* and a council member of the First Nations Fisheries Council, told me that the PICFI program is the “first step to addressing those longstanding injustices” of limited Aboriginal access to the fishery.¹⁰⁷³ He said that the First Nations Fisheries Council would like to see PICFI renewed for a further five years and with an additional \$450 million in funds to increase the First Nations’ share of commercial fisheries to 33 percent.¹⁰⁷⁴ According to a report by the First Nations Fisheries Council, “conditions are right so that a major surge in transfer can quickly generate widespread success” for First Nations commercial fishers. After 2017, the report suggests, additional programs would be necessary for First Nations to achieve a majority share in all fisheries by the year 2024.¹⁰⁷⁵

An internal DFO review of PICFI, dated August 2010, noted that “PICFI’s effectiveness to date has been mixed.”¹⁰⁷⁶ Although PICFI acquired licences from the commercial fishery, the program had yet to reach any long-term access agreements with Aboriginal organizations, and the development of Aboriginal capacity-building and governance structures had been “slower than expected.”¹⁰⁷⁷ The review also stated that 37.5 percent of individuals interviewed felt that PICFI was economical, and 62.5 percent said either that they did not know if it was economical or that it was not economical (34.4 percent and 28.1 percent, respectively).¹⁰⁷⁸ Ultimately this review “found some evidence that PICFI is efficient and economical” and recommended that DFO “plan for the continuation of PICFI activities after the five-year program ends, contingent on available resources.”¹⁰⁷⁹

Efforts to build a co-management relationship with Aboriginal peoples

A history of DFO’s co-management efforts

In recent decades, DFO has attempted to build a co-management relationship with Aboriginal peoples, many of whom have long desired more involvement in the management of the fishery. In this section of the Report, I describe the efforts both DFO and Aboriginal organizations have made toward the development of a co-management relationship and the challenges they have faced in doing so.

Although the discussion of policies and practices for Aboriginal fishing contained in this Report has primarily focused on the period following the 1990 *Sparrow* decision, Aboriginal organizations have long expressed their desire for a role in fisheries management. As early as 1987, an internal DFO memorandum on the status of the Aboriginal fishery noted that Aboriginal organizations had, over the years, submitted more than 25 co-management proposals to the department.¹⁰⁸⁰ These proposals included one from the Stó:lō Tribal Council seeking “the equal sharing of Fraser River fishery resource management responsibilities between Stó:lō people as original owners of the resource, and the Canadian government, representing other resource users and the Canadian people.”¹⁰⁸¹ In 1991, with pressure from Aboriginal groups for co-management mounting and before the launch of the Aboriginal Fisheries Strategy, DFO introduced an Aboriginal Fisheries Co-operative Management Program to fund Aboriginal participation in fisheries management, enhancement, and habitat improvement activities.¹⁰⁸²

In 1992, DFO launched its Aboriginal Fisheries Strategy, which, as described earlier in this chapter, includes the licensing of Aboriginal communal fishing access for FSC purposes and, in some cases, the provision of economic fisheries access. The Aboriginal Fisheries Strategy also allowed for “AFS Sub-Agreements” setting out the co-management responsibilities of Aboriginal organizations over specific and limited aspects of the fishery.¹⁰⁸³ DFO’s Policy for the Management

* The First Nations Panel on Fisheries, consisting of Russ Jones, Marcel Shepert, and Neil J. Sterritt, prepared *Our Place at the Table* in May 2004 (Exhibit 493).

of Aboriginal Fishing describes these areas of responsibility as, possibly, designating individuals to fish under allocations made to a First Nation, providing individuals designated to fish with evidence of such designation, monitoring harvests and reporting catch to DFO, and participating in enforcement activities.¹⁰⁸⁴ At the time, DFO saw Aboriginal Fisheries Strategy agreements as a “bridge” to the formal treaty relationships that it expected to negotiate within a decade.¹⁰⁸⁵

In November 1992, Peter Pearce delivered a report to the minister of fisheries and oceans following an investigation of the Fraser River salmon fishery. Noting the increase in co-management arrangements with individual groups and the introduction of pilot sales, Mr. Pearce reported on the importance of river-wide coordination among Aboriginal fisheries:

Co-management arrangements and commercial sales of Indian catches make river-wide co-ordination essential. It is widely understood among the Indian communities that such an arrangement is required for managing escape-ment through the succession of fishing areas on the river; for sharing access and available catches; for facilitating habitat management and for co-operating in surveillance and enforcement. It is imprudent for the government to proceed otherwise.¹⁰⁸⁶

In 1993, perhaps heeding Mr. Pearce’s recommendation for river-wide coordination of the Aboriginal fishery, DFO proposed a watershed-wide management structure to be formed under a Fraser Watershed Agreement.¹⁰⁸⁷ This agreement was intended to provide a “coordinated approach to the conservation, protection, and enhancement of fisheries, fish, and fish habitats of the [Fraser River Watershed], including fish health and quality, and allocations.”¹⁰⁸⁸ It expressly did not serve to “define or to limit aboriginal rights” but, rather, facilitated Aboriginal participation in fisheries management through membership on a joint Aboriginal-DFO co-operative management structure consisting of a steering committee, a technical committee, and a monitoring and enforcement committee.¹⁰⁸⁹ A Fraser River Aboriginal Fisheries Secretariat (FRAFS) was established to create a central Aboriginal fisheries office with biologists,

consultants, administrative staff, and communications staff to assist in the work of the Fraser Watershed Agreement committees.¹⁰⁹⁰

Although the Fraser Watershed Agreement was intended to include all the First Nations within the watershed, not all First Nations signed on. According to Mr. Huber, several groups were reluctant to sign the agreement because they felt coerced into doing so; signing on was a prerequisite to receiving Aboriginal Fisheries Strategy funding, and groups that refused to sign were left unfunded.¹⁰⁹¹ Other Aboriginal groups refused to sign on because of wording in the Fraser Watershed Agreement which acknowledged the authority of the federal minister to manage the fishery, while not acknowledging any Aboriginal authority.¹⁰⁹² I heard that the funding disparity between Aboriginal groups that signed on and those that did not created feelings of division among them.¹⁰⁹³

In 1995, the Honourable John Fraser reported to DFO on problems in the Fraser River sockeye fishery during 1994.¹⁰⁹⁴ The report recommended that First Nations be given “greater and more meaningful access to and involvement in the management process” and that DFO work with First Nations and with commercial and recreational fishing groups to increase co-operation and enhance fisheries management.¹⁰⁹⁵ However, Mr. Fraser also emphasized the importance of DFO maintaining its responsibility for the fishery. In particular, he said that “DFO has no right to transfer Canada’s constitutional responsibilities to protect the resource to anyone, Native or otherwise,” and that “this responsibility must be retained always by the Government of Canada.”¹⁰⁹⁶ His recommendations to DFO included the following: “We recommend that DFO retain and exercise its constitutional conservation responsibilities and not in any way abrogate its stewardship of resources under federal jurisdiction.”¹⁰⁹⁷ And, “We recommend that DFO ensure that AFS agreements clearly identify the Minister’s responsibility for conservation, and that final authority to regulate and protect fish and fish habitats remains vested in DFO.”¹⁰⁹⁸

On March 31, 1999, the Fraser Watershed Agreement lapsed and was not renewed.¹⁰⁹⁹ Following its expiration, the Stó:lō once again presented a co-management proposal to DFO, but it was not approved.¹¹⁰⁰ Instead, DFO appeared to focus on co-management relationships involving

not only First Nations but also commercial and recreational fishing sectors. In 1999, DFO launched its “national co-management initiative” and formally introduced its Integrated Fisheries Management Plan (IFMP) process in the Pacific Region.¹¹⁰¹ DFO’s national co-management initiative is set out in a three-volume *Framework and Guidelines for Implementing the Co-Management Approach*, which describes a standard framework for fisheries co-management as involving two steps: first, the IFMP document; and second, a legally binding, voluntary Joint Project Agreement, which spells out the roles and responsibilities of DFO and resource users with respect to specific co-management projects.¹¹⁰²

However, as DFO furthered its efforts toward co-management involving both First Nations and stakeholders, it once again received an external report on the importance of asserting the minister’s authority over fisheries management. The 2001 Report of the Standing Committee on Fisheries and Oceans, led by Tom Wappel, recommended that “the Minister of Fisheries and Oceans reassert his authority to manage the fishery.”¹¹⁰³

By the early 2000s, almost 10 years had passed since several Fraser River watershed First Nations first entered treaty negotiations, and it became clear that little progress had been made in coming to permanent fisheries management agreements through treaty. The Fraser Watershed Agreement had lapsed, and Aboriginal groups were becoming increasingly frustrated with their level of participation in DFO decision making. In 2003, DFO met with Aboriginal groups to hear their concerns. That fall, DFO released a document entitled *Strengthening Our Relationships: The Aboriginal Fisheries Strategy and Beyond*, in which it acknowledged that Aboriginal groups were “seeking greater participation in decision-making and advisory processes used for aquatic and resource management.”¹¹⁰⁴ This paper recommended federal funding to build Aboriginal capacity for participation in aquatic resources and oceans management.¹¹⁰⁵

In July 2003, the federal and provincial governments jointly announced the creation of a task force to advise on “vital issues relating to the fishery” in a post-treaty era. Donald McRae and Peter Pearse were appointed as members of the task force, and they released a report entitled *Treaties and Transitions* in April 2004. Noting that there was no Aboriginal representative on the task force, the

BC First Nations Summit and the BC Aboriginal Fisheries Commission lobbied for funding to produce a report offering the Aboriginal perspective. Their efforts led to the creation of the First Nations Panel on Fisheries and a report entitled *Our Place at the Table*, released in May 2004.¹¹⁰⁶

The Pearse and McRae report supported the notion of “participatory management” for salmon involving Aboriginal groups and others, which the authors said would “provide a much more promising basis for managing the fishery.”¹¹⁰⁷ Although they noted that DFO had “accommodated the development of co-management regimes,” they criticized the government for not setting out clear procedures, requirements, or criteria for establishing co-management arrangements and for not clearly articulating its position on such arrangements.¹¹⁰⁸ Pearse and McRae recommended that the minister “issue a policy statement declaring that the government supports co-management as a means of improving the management of the fisheries.”¹¹⁰⁹ They also recommended amendments to the *Fisheries Act* that would allow for the devolution of authority from the minister to fishery participants. In particular, Pearse and McRae suggested that one of the “fundamental weaknesses” of the *Fisheries Act* is that “it makes all fisheries management rest on Ministerial discretion,” which they say results in “a highly centralized management system, which is inimical to the meaningful involvement of fishers and others.”¹¹¹⁰ This recommendation runs counter to those of Mr. Fraser in 1994 and of the Standing Committee on Fisheries and Oceans in 2001, noted above, which both recommend a clear assertion of the minister’s ultimate authority.

The First Nations Panel on Fisheries report, *Our Place at the Table*, supported a three-tiered management structure: the first tier involving discussions and organizational relationships among First Nations only; the second tier involving First Nations and the federal government; and the third tier involving First Nations, the federal and provincial governments, and third parties.¹¹¹¹ The authors asserted an Aboriginal right to manage the fisheries, saying that “a legal foundation exists for First Nations to pursue management and conservation schemes in consultation with the Crown,” and suggested that “[s]uch a scheme would reflect aboriginal values and practices; seek reparation and mitigation for past and on-going impacts; and

provide for First Nations' and Crown participation to determine the appropriate levels of resource use and management."¹¹¹² The authors recommended that "Canada immediately recognize in policy, and implement through negotiated agreements, the aboriginal right to manage fisheries."¹¹¹³

Following release of the Pearse and McRae report and the First Nations Panel on Fisheries report, DFO responded by introducing a new Aboriginal capacity-building program and seeking feedback from Aboriginal and other communities on potential changes to fisheries management. In October 2004, DFO launched AAROM (discussed above) to develop Aboriginal participation in fisheries management. This program provides \$6 million to \$7 million in funding per year to Pacific Region Aboriginal organizations to facilitate Aboriginal capacity building, pay for technical staff, and increase Aboriginal participation in DFO advisory and decision-making processes.¹¹¹⁴ From October 2004 to March 2005, DFO held consultations with more than 30 First Nations and stakeholder organizations to discuss how it should respond to *Treaties and Transitions* and *Our Place at the Table*. A DFO presentation summarized these consultations as showing "general support" for "adoption of co-management, with increased stakeholder input to decision making."¹¹¹⁵

In 2005, efforts to build a new "government-to-government" relationship between Aboriginal governments and the federal and provincial governments went well beyond the fishery. Three of the leading Aboriginal organizations in British Columbia (the First Nations Summit, the Union of BC Indian Chiefs, and the BC Assembly of First Nations) committed to work together in the form of a First Nations Leadership Council to advance Aboriginal rights and reconciliation with other Canadians. The First Nations Leadership Council soon after entered into agreements with the province (the New Relationship Vision Document) and the federal government (the First Nations–Federal Crown Political Accord on the Recognition and Implementation of First Nations Governments), each of which sought to respect Aboriginal governments and lead to policy transformations in areas of common interest. By November 2005, a Transformative Change Accord was signed by the First Nations Leadership Council, the Government of Canada, and the Government of British Columbia, acknowledging "the importance of First

Nations governance" and highlighting mutual respect and responsibility as a key principle.¹¹¹⁶

It is in this context of renewed government-to-government relationships that, in 2005, DFO developed the Pacific Fisheries Reform as its response to the Pearse and McRae report and the First Nations Panel on Fisheries. A "key element" of this plan was "shared management responsibility and accountability" over the fisheries with First Nations, stakeholders, and others. Documentary evidence before me suggests that, at this time, DFO contemplated a greater role for these groups in its decision-making process and in assuming part of DFO's fisheries management responsibilities. In fact, a DFO discussion paper dated September 2005 suggests that fisheries management functions that rely heavily on the federal government are inconsistent with the sharing of responsibility and accountability that DFO sees in "modern governance":

[Fisheries] reform needs to re-define the role of First Nations, stakeholders and government in the management of fisheries. Although management practice in recent years has shifted towards more sharing of management responsibility and accountability with harvesters and others, progress across fisheries has been uneven and less than fully adequate, resulting, in some cases, in frustration in one or more parties. Current practice in many fisheries still relies heavily on government, where the DFO is responsible for defining conservation goals, developing fishing plans, opening and closing fisheries, monitoring and collecting data on fish stocks and fisheries and the enforcement of all rules and regulations. This type of approach is out of synch with the direction of modern governance and the demand of citizens for greater engagement in decisions that directly affect them.¹¹¹⁷

DFO's Pacific Fisheries Reform envisions a situation in which participating First Nations and stakeholders are "involved in decision-making and share accountability for the conduct of the fishery."¹¹¹⁸ They would assume "a greater role in operational decision-making and program delivery through effective co-management processes."¹¹¹⁹ This plan contemplated a multi-stakeholder co-management process in the form of the Integrated Harvest Planning Committee. DFO saw the IHPC

as “the forum where First Nations, recreational fishery, commercial fishery and environmental organization representatives come together to develop coastwide integrated salmon management plans,” while “[b]i-lateral consultations between First Nations and DFO” would occur for “specific planning purposes.”¹¹²⁰

However, DFO continued to receive concerns regarding co-management. In 2004, after nearly 1.3 million fish failed to reach spawning grounds as expected that year, the Honourable Bryan Williams, a former chief justice of the BC Supreme Court, was tasked with reviewing the salmon fishery. His report, released in March 2005, offered a strong critique of DFO’s recent efforts to share management of the fishery with fishery participants. He suggested that, instead of focusing on managing fisheries and ensuring sustainability of the resource, DFO had shifted its goals to attempting to satisfy the demands of stakeholders.¹¹²¹ Although he recognized the potential for co-operation in the fishery, he doubted co-management’s “net effectiveness in delivering the core mandate of DFO” and suggested that DFO’s attempts to satisfy all parties might lead to actions that satisfy none:

DFO has concluded that resource management will be easier if all stakeholders: First Nations, commercial fishers, sports fishers and environmental organizations, can be brought into a room, express their views and agree with DFO on a management plan. In theory this approach seems laudable, and if consensus is achieved would be political nirvana. Striving to achieve solutions that satisfy every interest may result in actions that satisfy none. More important though is the question of whether this approach will result in fisheries that satisfy the core mandate of DFO: resource conservation and sustainable use that maximizes society’s cultural, social and economic benefits. This test is more of an objective standard than the opinions of stakeholder groups ... The 2004 Fraser River sockeye situation is strong evidence that DFO strategy is failing on this test.¹¹²²

Mr. Williams recommended that public involvement is a “good thing” and that the public ultimately holds DFO responsible and accountable. For that reason, costly collaborative management

approaches should be “evaluated explicitly against the goals set for fisheries management.”¹¹²³

In June 2005, DFO continued efforts toward co-management as part of its Wild Salmon Policy, but it did so in a manner that clearly articulated the ultimate authority of the minister.¹¹²⁴ This policy states that “co-management will be promoted with First Nations, and more partnerships will be necessary with public and private groups.”¹¹²⁵ (For further discussion, see Chapter 10, Wild Salmon Policy). Action Step 4.2 of the Wild Salmon Policy contemplates the creation of an “integrated strategic planning process” for Pacific salmon, taking into account the views of First Nations, provincial and territorial governments, communities, and stakeholders.¹¹²⁶ However, unlike Pacific Fisheries Reform, which describes the sharing of accountability as a “key element,” the Wild Salmon Policy asserts that the minister “retains the authority and accountability for the protection and sustainable use of fisheries resources and their habitat.”¹¹²⁷ Indeed, although the Wild Salmon Policy contemplates co-management in developing strategic plans for salmon conservation and sustainable use, such plans are subject to final approval by the minister.¹¹²⁸

By 2006, however, DFO returned to policy language that, on a plain reading, suggests something less than the ultimate authority resting with the minister. DFO’s Integrated Aboriginal Policy Framework sets out seven strategies for the management of Aboriginal fisheries, including “supporting increased aboriginal participation in co-management of aquatic resources.”¹¹²⁹ Co-management is defined in the IAPF as a sharing of accountability, the devolution of management authority, and a shift away from DFO’s current management structure:

Co-management is defined as: “the sharing of responsibility and accountability for fisheries management between Fisheries and Oceans Canada and resource users. Co-management will eventually encompass the sharing of authority for fisheries management”;

It is the policy of DFO to shift from top-down centralized management of the fisheries resource by the Department to a shared stewardship of the resource that includes the devolution of certain fisheries management authorities to resource users.¹¹³⁰

As a “critical outcome” of co-management, the IAPF envisions “*Fisheries Act* amendments that provide for greater involvement of aboriginal groups and others in decision-making processes” and the creation of management structures that would allow the government and users of the resource to share responsibility for resource management.¹¹³¹ The IAPF also recognizes “various systems of authority and decision making in fisheries management,” and nowhere in the document does DFO assert the ultimate authority of the minister.¹¹³² The former regional director of Treaty and Aboriginal Policy and Governance Directorate explained, in testimony, that the IAPF was drafted during a time when the federal government contemplated revisions to the *Fisheries Act* that did not occur.¹¹³³

By 2008, DFO’s AAROM program had funded the creation of a multitude of sub-regional Aboriginal fisheries organizations and at least one province-wide Aboriginal fisheries organization, all of which were formed for the purpose of increasing Aboriginal capacity to participate in fisheries management. Aboriginal groups continued to express a desire to develop a co-management process between DFO and First Nations regarding Fraser River salmon.¹¹³⁴ In response, DFO established the Fraser River Salmon Roadmap (Roadmap). The Roadmap provides a forum where Aboriginal groups from throughout the Fraser River watershed, Vancouver Island, and marine approach areas can meet with each other and with DFO staff to design a permanent co-management process for Fraser River salmon.¹¹³⁵ A DFO overview of the Roadmap suggests that such a co-management process will include “a more prominent role for First Nations related to fisheries management, policy and decision-making.”¹¹³⁶ However, after several years of meetings, the Roadmap has yet to result in an agreement on a co-management structure for DFO and First Nations.

Issues arising from DFO’s efforts to build co-management relationships

Defining co-management

In 1987, a Pacific Region area manager wrote to his regional director of fisheries management and voiced his concern over DFO’s lack of definition for co-management:

The concept of co-management is not yet fully defined and at present, each side applies a different meaning to the term. The view of the [First Nations] is that co-management implies recognition of ownership and that the fishery is then co-managed between the Government of Canada and the native people (owners). The Departmental view is that co-management is a program activity, funded by government, and cooperatively implemented with varying levels of native involvement (up to 100%). There is a fundamental philosophical difference over the co-management issue and to proceed to any shared programs at this point with such widely divergent agendas is to risk disappointment.¹¹³⁷

More than two decades later, DFO employees told me that the department still has no single definition for co-management and that it is “trying to come up with different ... definitions.”¹¹³⁸ Though definitions of co-management are found in both the Pacific Fisheries Reform discussion paper (“meaningful involvement”) and in the Integrated Aboriginal Policy Framework (“sharing of responsibility and accountability” and “devolution” of management authorities), none of them was to be taken as definitive.¹¹³⁹

As I heard witnesses describe their efforts to develop a co-management relationship between First Nations and DFO, it became apparent that they all carried their own understanding of the term. Ms. McGivney described co-management as “management with partners,” Ms. Stewart as “participatory management,” Mr. Rosenberger as “shared responsibilities,” and Ms. Farlinger as “an effective process to consult and collaborate on designing a plan at a strategic and operational level.”¹¹⁴⁰

As discussed above, many First Nations assert an inherent Aboriginal authority over fisheries management. The definition of co-management that I heard from several Aboriginal witnesses reflects this desire for equal decision-making authority with the minister. Some witnesses preferred the term “joint management” rather than “co-management,” to capture this equality.¹¹⁴¹ This preference is explained in a recent First Nations Fisheries Council communiqué:

A joint management arrangement based on section 35.1 rights is different than the types of

“co-management” relationships that DFO has with third parties. The term co-management is typically used more broadly at and between all three tiers, and is [an] inclusive reference to working together, whereas joint management can be specifically in reference to a government to government working relationship between First Nations and DFO.¹¹⁴²

Challenges caused by the differences between DFO’s multiple definitions for co-management and Aboriginal aspirations for co-management, or “joint management,” were not lost on the witnesses. Grand Chief Pennier told me that “there [are] different interpretations and we need to come up with one where we all believe that it’s going to work towards making good decisions on fishing.”¹¹⁴³ Similarly, a recent report on the Roadmap process suggested that participants must “figure out what co-management or joint management means” and that, “without agreement on the term co-management, Roadmap participants have not been able to agree what to call the arrangement they are seeking.”¹¹⁴⁴

Authority of the minister

In the testimony of Ms. McGivney and in internal DFO documents such as the Aboriginal Fisheries Framework, it appears that DFO regards the minister as the ultimate authority and that it has no intention at present of entering into an agreement that fails to respect such authority.¹¹⁴⁵ However, DFO’s assertion of this position has not always been clear. For example, Mr. Huber told me that DFO has removed the assertion of the minister’s authority from recent AFS agreements so as not to offend Aboriginal signatories.¹¹⁴⁶ In addition, public DFO documents still in effect from the 2005 and 2006 period, such as the Pacific Fisheries Reform discussion paper and the Integrated Aboriginal Policy Framework, give the impression that the minister’s authority may be shared. Specifically, to the extent that these documents refer to the potential for “sharing of management responsibility and accountability” or the “devolution” of fisheries management authority, they may raise an expectation that the minister’s ultimate authority may be shared. Claire Dansereau, deputy minister, told me that “there is potential for modernizing the *Fisheries Act* in some parts to ensure that there is room

outside of the Minister constantly being the final decision point.”¹¹⁴⁷ I find such comments unhelpful in clarifying either DFO’s current authority under the law or its intended policy direction.

In contrast, First Nations have been clear and consistent in asserting an inherent Aboriginal jurisdiction over fisheries management.¹¹⁴⁸ Several witnesses told me that, in their view, such jurisdiction requires that DFO share decision-making authority with them in an equal manner.¹¹⁴⁹ First Nations have been working toward this goal, and they have expressed it clearly to DFO. For example, the *BC First Nations Fisheries Action Plan* states that “a central First Nations role in management is necessary, based on aboriginal and treaty rights and title” and in setting as a goal “that First Nations, federal and provincial governments jointly manage aquatic species and ecosystems.”¹¹⁵⁰ Similarly, the First Nations Fisheries Council’s Co-Management Discussion Paper, using language similar to that found in DFO’s Pacific Fisheries Reform, describes co-management as the “sharing of management responsibility and accountability.”¹¹⁵¹ In view of this expectation for shared responsibility and accountability, this discussion paper points to the ultimate authority of the minister as a “key barrier” to achieving co-management.¹¹⁵²

Parties to engage in fisheries management

The First Nations Panel on Fisheries recommended in its 2004 report that fisheries management apply three tiers of decision-making relationships (as described above).¹¹⁵³ In brief, the first tier would involve Aboriginal groups meeting with each other (Tier 1); the second tier would involve meetings between Aboriginal groups and DFO (Tier 2); and the third tier would involve meetings among First Nations, government, and stakeholders (Tier 3).

I heard significant support for Tier 1 processes from both DFO witnesses and Aboriginal witnesses, as well as through the documentary evidence. A First Nations Fisheries Council paper suggests that Tier 1 forums allow First Nations to come together, share information, and articulate shared priorities and approaches to fisheries management.¹¹⁵⁴ Councillor June Quipp told me that such meetings help Aboriginal peoples to build trust among themselves.¹¹⁵⁵ Mr. Shepert told me of the “tremendous amount of understanding, trust and knowledge”

of other groups' fisheries that he has seen develop through such meetings in recent years.¹¹⁵⁶ Mr. Rosenberger agreed with the importance of Tier 1 relationships, telling me that Aboriginal groups need a process to resolve their disputes and that this meeting together would be "key" for long-term improvements in fisheries management.¹¹⁵⁷ Several witnesses also told me that, with adequate organizational and Tier 1 funding support, First Nations could select mandated representatives to participate effectively in meetings with DFO and other groups.¹¹⁵⁸

As described in Chapter 3, Legal framework, DFO has a legal obligation to consult directly with First Nations when it contemplates conduct that may adversely affect an Aboriginal right. With respect to such consultation, Tier 2 relationships will always be required in any fisheries management process. In addition to meeting potential legal obligations, DFO has policy reasons for building on its relationship with Aboriginal groups. As previously discussed, the purpose underlying Aboriginal rights is to ensure the continued existence of distinctive Aboriginal societies. The Aboriginal perspective must be taken into account, and as I heard from several witnesses, Tier 2 relationships are necessary to provide a venue in which First Nations can express their needs in the fishery to DFO.¹¹⁵⁹ I also heard optimism from Aboriginal witnesses that Tier 2 relationships could improve management relationships between First Nations and DFO.¹¹⁶⁰ As an example, I heard from Grand Chief Terry that the Northern St'at'imc Fisheries Commission has established a working group with DFO to develop fisheries plans for the Lillooet area, including catch monitoring and weak-stock protections. In his view, the working group has allowed the St'at'imc to pass on their knowledge and understanding of certain stocks to DFO, and vice versa.¹¹⁶¹

With regard to Tier 3 processes, although I heard support from some Aboriginal witnesses, I heard significant resistance from several others. For example, Chief Jones told me that forcing First Nations to participate in meetings with other fisheries groups on an equal basis would not recognize asserted Aboriginal rights to the fishery.¹¹⁶² Mr. Wilson testified that, as owners of the fish, First Nations ought not, in his view, to be lumped into meetings with others.¹¹⁶³ Neil Todd,

operations manager of the Fraser River Aboriginal Fisheries Secretariat, suggested that management meetings take place with DFO and First Nations only, with DFO representing the interests of all non-Aboriginal groups.¹¹⁶⁴ In contrast, I heard from DFO witnesses on the importance of Tier 3 processes.¹¹⁶⁵ For example, Mr. Rosenberger explained that fisheries co-management is not a concept for First Nations and DFO only; rather, DFO's concept of a "fishery for all" requires that collaborative management arrangements integrate everyone.¹¹⁶⁶ According to Mr. Matthew of the Secwepemc Fisheries Commission, DFO has "made many attempts to try to allow First Nations to provide representatives" to processes such as the IHPC, and First Nations, in turn, have been trying to coordinate representation at that panel.¹¹⁶⁷

The Wild Salmon Policy states that "inclusiveness" is one of the key attributes of an effective integrated strategic planning process for fisheries.

All parties that are affected by a planning outcome should have the opportunity to provide input to the articulation of objectives, the identification of management options, and the evaluation and selection of management alternatives. All parties should respect the others' opinions and processes, and work towards consensus.¹¹⁶⁸

Although the existence of Aboriginal rights in relation to the fishery, whether proven or claimed, will give rise to a special relationship between First Nations and DFO, I agree with the emphasis on an inclusive fisheries management process outlined in the Wild Salmon Policy. As described in Chapter 3, Legal framework, the Supreme Court of Canada has determined that the fishery is a common property resource. At present, there is no judicially recognized Aboriginal right to manage the Fraser River sockeye fishery, and consequently, the fishery ought to be managed in a manner that is inclusive of all concerned.

Aboriginal capacity to participate in fisheries management

The management of Fraser River sockeye fisheries can be complex, highly technical, and time consuming. I heard that, in order for Aboriginal organizations to participate in fisheries management,

they require adequate funding, organizational infrastructure, and technical support.¹¹⁶⁹

On certain issues, some First Nations seek the capacity to coordinate their views and speak with one voice toward the development of fisheries policy.¹¹⁷⁰ DFO supports the formation of such aggregates: Ms. McGivney told me that, by working with a broad, collaborative group of First Nations, DFO hears multiple issues at the same table and can thereby manage the fishery more effectively and efficiently.¹¹⁷¹ Similarly, Mr. Rosenberger testified that aggregated meetings allow DFO to hear concerns across a broader geographic area – a process that assists DFO in integrating its fisheries planning.¹¹⁷²

DFO has provided funding for Aboriginal capacity building through its AFS, AAROM, and PICFI programs. In 2009, DFO distributed \$6.2 million to Aboriginal fisheries organizations in the Pacific Region through the AAROM program, and an additional \$1.4 million to AAROM organizations through its PICFI program.¹¹⁷³ In 2009, DFO also distributed an additional \$14.4 million to Aboriginal organizations as part of AFS co-management funding.¹¹⁷⁴ As of August 2010, there were 14 AAROM-funded Aboriginal fisheries organizations in the Fraser River and South Coast areas of British Columbia.¹¹⁷⁵

At the time of the hearings, there did not appear to be a clear preference among Aboriginal witnesses as to which aggregated Aboriginal fisheries organization ought to represent them, and some witnesses expressed the view that no one aggregated organization can speak on behalf of their community.¹¹⁷⁶ Some witnesses suggested that certain fisheries matters that may affect Aboriginal rights must be dealt with at the local community level, such as consultation, accommodation, and allocations.¹¹⁷⁷ As a result, DFO engages with several aggregate Aboriginal organizations in addition to engaging with individual First Nations.

An internal DFO presentation on co-management dated July 2010 notes that DFO's development of a multitude of management relationships with various organizations has led to confusion. It states, "The absence of a coherent 'framework' that outlines linkages between the various processes (bilateral vs. multi-sectoral, local vs. coastwide) results in fragmented, inconsistent participation, [and] uncertainty about how input from different processes informs decision-making."¹¹⁷⁸

This presentation goes on to suggest that one of the key challenges facing DFO's efforts toward co-management is a "lack of coordination and overarching strategy" whereby "DFO is involved in a wide range of co-management and advisory processes, but it's not clear how they all fit, or [have] an overall structure and approach to co-management."¹¹⁷⁹ Without clarity around the process scope, and the roles and responsibilities of participants, this presentation suggests that DFO is left asking, "Where does DFO lead and where [does it] participate?"¹¹⁸⁰

The development of modern treaty fisheries

Fraser River sockeye are harvested by Aboriginal groups both inside and outside treaties. As explained in Chapter 3, Legal framework, I agree with participants in this Inquiry that my Terms of Reference do not direct me to make any determination of the existence or content of Aboriginal and treaty rights. As such, I make no recommendations on the interpretation or implementation of existing treaties, whether historical or modern. However, certain aspects of DFO's Aboriginal fisheries policies and programs which relate to the conservation and sustainability of the Fraser River sockeye salmon fishery (discussed above) may inform Canada's future negotiation of fisheries chapters in treaties.

In 1992, the BC Treaty Commission was established under the *Treaty Commission Act* to facilitate the negotiation of modern treaties in British Columbia.¹¹⁸¹ Soon after, several First Nations situated in the Fraser River watershed entered into treaty negotiations, including the Tsawwassen First Nation (1993), the Lheidli T'enneh Band (1993), the Yale First Nation (1994), the Sliammon Indian Band (1994), the Yekooche First Nation (1995), and others.¹¹⁸² At the time, some First Nations and the Canadian government were optimistic that long-standing fisheries issues would be addressed and that treaty negotiations would be completed within a decade.¹¹⁸³

The completion of treaty arrangements has not occurred as originally hoped. Although the Nisga'a Final Agreement came into effect in May 2000, it was reached as part of a unique process

outside the BC Treaty Commission.¹¹⁸⁴ In October 2006, the Lheidli T'enneh Final Agreement became the first modern treaty signed pursuant to the BC Treaty Commission process, and it would have been the first modern agreement to provide treaty rights with respect to Fraser River sockeye salmon.¹¹⁸⁵ However, in March 2007, after 14 years of negotiations and effort, the agreement was rejected by Lheidli T'enneh band members, and it has never been ratified.¹¹⁸⁶

More recently, several treaties have completed successfully. In December 2007, the Tsawwassen First Nation Final Agreement was signed, and in April 2009, it came into effect. In 2009, the Maa-nulth First Nations Final Agreement was signed; it came into effect in April 2011.¹¹⁸⁷ In February 2010, the Yale First Nation Final Agreement was signed.¹¹⁸⁸ It has since been ratified by the Yale First Nation and the provincial government and is awaiting ratification by the federal government.

For the majority of other treaty tables, progress has been slow. In May 2004, the First Nations Panel on Fisheries observed that “parties have not seen eye to eye on many critical issues, including the fisheries,” and that “more and more First Nations are turning to litigation to protect their rights and interests.”¹¹⁸⁹ Similarly, the First Nations Fisheries Action Plan noted in 2007 that litigation, rather than treaty negotiation processes, has “been more successful in effecting changes in the Pacific fishery.”¹¹⁹⁰ By July 2008, Canada decided to stop fishery-related negotiations at all treaty tables with the exception of the few that had reached late-stage negotiations.¹¹⁹¹ As described above, Canada instead focused on clarifying its internal policies on the future allocation of post-treaty fisheries through the confidential Coastwide Framework and Aboriginal Fisheries Framework.¹¹⁹²

This Commission of Inquiry was struck in November 2009. On March 2, 2010, the Government of Canada (minister of fisheries and oceans and minister of Indian and northern affairs) announced that treaty negotiations related to Aboriginal fisheries would be deferred pending the conclusion of this Inquiry.¹¹⁹³ This deferral did not affect the Yale First Nation, In-SHUCK-ch Nation, and Sliammon First Nation agreements, which had reached their final stages.¹¹⁹⁴

Recognition of the minister's ultimate authority

Modern treaties, such as the Tsawwassen First Nation Final Agreement, have recognized a limited Aboriginal jurisdiction over internal fisheries matters.¹¹⁹⁵ As a result, the *Tsawwassen Wildlife Migratory Birds and Renewable Resources Act* and its associated *Fisheries Regulations* set out who may fish in Tsawwassen territory, how fisheries access is distributed among Tsawwassen members, and how their fishing licences will be issued, among other things.¹¹⁹⁶ However, according to DFO, a key principle applied to treaty negotiations to date has been that the ultimate authority of the minister to manage fish and fish habitat must be respected.¹¹⁹⁷ This principle is “a key bottom line for Canada,” and the minister's authority is explicitly stated in all BC treaties.¹¹⁹⁸

Integration of fisheries management processes for treaty and non-treaty fisheries

DFO recognizes that treaties have not provided the broad resolution of Aboriginal fisheries matters as originally hoped. Ms. McGivney told me that Canada is “a ways away from the majority of First Nations in BC having treaties.”¹¹⁹⁹ Some Aboriginal groups are not interested in entering into treaties at all.¹²⁰⁰ Although DFO's 2005 Pacific Fisheries Reform document reiterated the federal government's belief that treaties would “ultimately secure the place of First Nations in the fishery,” it also acknowledged that, “given the slow pace of negotiations, interim arrangements would be necessary.”¹²⁰¹

Ms. McGivney told me that DFO needs to consider how to manage fisheries for groups in treaty as well as those outside treaties.¹²⁰² The Aboriginal Fisheries Framework describes some of DFO's options as the negotiation of independent fisheries treaties with First Nation aggregates, separate from individual comprehensive treaty agreements, as well as “non-treaty options,” such as enhancing current Aboriginal fisheries programming (e.g., AFS, AAROM, PICFI) or declaring overall First Nation shares for salmon by watershed and species through policy.¹²⁰³

My Terms of Reference direct me to make findings of fact on causes for the decline of Fraser

River sockeye salmon and to make recommendations for the future sustainability of the fishery. They do not specifically direct me to investigate the treaty process as it relates to the fishery. I cannot determine, based on the evidence before me, whether treaties are the best solution for bringing stability to management of the Aboriginal fisheries or whether non-treaty options should be pursued instead. However, it is clear that the options chosen ought to allow for an integrated fisheries management process for the Fraser River sockeye fishery as a whole.

DFO has stated that, under modern treaties, “First Nations will be provided with an expanded collaborative role in the management of their fishery, subject to the Minister’s authority.”¹²⁰⁴ This approach has included the development of joint fisheries committees comprising First Nations and government representatives tasked with planning the FSC fishing activities for the First Nations, stock assessment, fisheries management, stock enhancement, catch monitoring, and enforcement.¹²⁰⁵ The Joint Fisheries Committee strives to reach consensus, but, in the absence of consensus, submits recommendations to the minister for his or her decision.¹²⁰⁶ Chief Baird told me that the Joint Fisheries Committee established under the Tsawwassen First Nation Final Agreement, while not “perfect,” was a “step towards the right direction” and formalized her nation’s relationship with DFO “in a way that is workable and has access points from the political to technical and the operational.”¹²⁰⁷ However, because a separate Joint Fisheries Committee is formed under each treaty, DFO is concerned “whether this approach is affordable, manageable and ultimately viable given the number of Joint Fisheries Committees that may result.”¹²⁰⁸

Allocating FSC fisheries access in treaties

As with other components to a treaty, the FSC allocation is the product of negotiation. As described above, in determining FSC fisheries allocations generally, DFO negotiators consider the following factors: recent harvest levels; species availability; species abundance; allocations for other First Nations; and population size.¹²⁰⁹ In the treaty context, the FSC allocation may also be determined based on the “overall balance of negotiated benefits

within the treaty.”¹²¹⁰ Treaty negotiations involve compromise, and a First Nation may opt for more or less FSC fish in exchange for other benefits. For example, according to Chief Baird, the Tsawwassen First Nation accepted a lower percentage allocation of FSC fish in order to obtain a greater share of the commercial fishery through a commercial harvest agreement signed in conjunction with the treaty.¹²¹¹ According to DFO, in most cases the FSC allocations negotiated under treaty will be higher than what a First Nation had before treaty. The reason for this increase is to take into account the First Nation’s future population growth.¹²¹²

FSC treaty allocations are typically based on abundance, meaning that they are calculated as a “percentage of [fish] abundance above a conservation threshold.”¹²¹³ For example, the Tsawwassen First Nation allocation of Fraser River sockeye salmon for FSC purposes is calculated as a percentage of the total allowable catch returning in a given year, capped at a maximum of 15,226 Fraser River sockeye salmon.¹²¹⁴ Not all treaties include a maximum or “capped” FSC allocation, however. The Maa-Nulth First Nations Final Agreement contains an allocation of Fraser River sockeye salmon for FSC purposes of 0.13366 percent of total allowable catch, without any maximum limit.¹²¹⁵ In 2010, the relatively high returns meant that the Maa-Nulth allocation amounted to between 17,000 and 18,000 Fraser River sockeye, despite Fraser River sockeye being a “relatively minor intercepted stock for Maa-Nulth” (according to DFO).¹²¹⁶

Allocating commercial fisheries access in side agreements

With respect to treaties formed under the BC Treaty Commission process, commercial fishing allocations are not provided under the treaty itself but may instead be offered as part of a “harvest agreement” negotiated alongside the treaty. According to DFO, harvest agreements are not constitutionally protected, and the communal commercial fishing access that they provide will have the same priority as the general commercial fishery.¹²¹⁷ However, harvest agreements negotiated to date have been for terms of 25 years and may be renewed in perpetuity.¹²¹⁸

Harvest agreements may specify a commercial harvest allocation as a percentage of the total

allowable catch or may provide for the issuance of commercial licences for participation in existing “derby” fisheries (meaning that, with each commercial fishery opening, licensed fishers catch as much of the target species as they can while that fishery is open). DFO asserts that “neither a target nor a range currently exists for harvest agreement allocations.” Instead, the extent of commercial benefit contained in a harvest agreement is the product of negotiation. Also, DFO does not conduct an “economic needs” assessment to determine how much commercial access a given First Nation should receive. Not all First Nations are seeking harvest agreements, though some are very interested in them.¹²¹⁹

In a written response to an information request from Commission counsel, DFO stated that “to the extent that inland First Nations negotiate harvest agreements for salmon, there will likely be an increase in fish caught in more terminal areas,” and this activity will “likely be just one component of a more general increase in stock specific harvesting in more terminal locations in response to conservation concerns for weak stocks.” All First Nations economic fisheries access that is provided through harvest agreements will require relinquishment of equivalent licences or catch shares from the general commercial fishery.¹²²⁰

Findings

Definition for food, social, and ceremonial fishing

The Department of Fisheries and Oceans (DFO) has no specific definition for the term “food, social, and ceremonial” (FSC) fishing, and there is a lack of consistent understanding within DFO and among DFO and First Nations as to what this term means. Although DFO has articulated guidelines for fisheries managers in allocating FSC access, in many cases the resulting allocations remain controversial. For their part, few First Nations, I heard, have provided support for their requested FSC allocations, and many other groups view the quantification of FSC access solely for First Nations themselves.

As a result of the disagreement surrounding the FSC allocation process, I heard concerns that some FSC allocations are too low and that others are too high. Both situations have the potential

to affect the future sustainability of the Fraser River sockeye salmon fishery. As described in Chapter 1, Commission’s mandate, the Fraser River sockeye salmon fishery is made up of commercial, Aboriginal, and recreational sectors, and each of these sectors must be considered in my recommendations on the sustainability of the fishery as a whole.

Ensuring that an adequate FSC allocation is provided to Aboriginal groups is central to the sustainability of the Aboriginal component of the fishery. As described in Chapter 3, Legal framework, Aboriginal FSC fisheries are intended to provide Aboriginal communities with the opportunity to carry out the fisheries practices, customs, and traditions that may be integral to their distinctive Aboriginal cultures. I acknowledge that the underlying purpose of Aboriginal rights recognition, as articulated by the Supreme Court of Canada in *R. v. Sappier* and *R. v. Gray*, is to ensure the continued existence of distinctive Aboriginal societies.¹²²¹ To the extent that any FSC fishing allocations may be less than what is needed by Aboriginal groups to sustain the fisheries practices, customs, and traditions integral to their distinctive Aboriginal cultures, that shortfall may put at risk the sustainability of the traditional Aboriginal FSC fishery as well as the Aboriginal cultural connection to that fishery.

Ensuring that FSC allocations do not exceed the food, social, and ceremonial needs of Aboriginal groups is also important for the sustainability of the commercial and recreational fisheries. As described in Chapter 3, Legal framework, after conservation needs are met, FSC fisheries are to be given priority access over commercial and recreational fisheries. The effect of this priority, as articulated in *R. v. Sparrow*, is that, in years of low abundance, it may be that all the fish caught will be allocated for FSC purposes, and the brunt of conservation measures will be borne by commercial and recreational fisheries.¹²²² The larger the FSC allocation, the fewer fish will be available to commercial and recreational fishers after conservation needs are met, and the greater likelihood that fish returns in low-abundance years may not be sufficient to allow any commercial fishery at all. To the extent that any FSC fishing allocations may be more than required to meet FSC needs, this over-allocation may put at risk the sustainability of the commercial and, possibly, the recreational fisheries.

I agree with participants that my Terms of Reference do not grant me the jurisdiction to make findings on the existence or content of Aboriginal rights. As such, I make no findings on the appropriate definition or quantification of FSC fisheries. However, I conclude that DFO requires a clear policy definition for food, social, and ceremonial fishing in order to appropriately manage and allocate fisheries for FSC purposes and to ensure that the quantity of FSC fisheries access provided is appropriate, given its effect on the sustainability of Aboriginal, commercial, and recreational fisheries. The development of this policy definition and its application to individual Aboriginal groups should be informed by the views of affected Aboriginal groups. As such, Aboriginal groups should be encouraged to provide information to DFO on the aspects of their cultural and fishery needs they wish DFO to consider.

Transparency in the reallocation of the Fraser River sockeye salmon fishery

Since 2008, DFO has been developing the Aboriginal Fisheries Framework, which, among other things, sets out an overall percentage of the available salmon harvest to be allocated to First Nations for both FSC and economic opportunity fisheries. DFO has not made public the overall percentage allocation contained in the Aboriginal Fisheries Framework. In response to my order requesting that this overall percentage be disclosed, DFO provided me with a letter from the clerk of the privy council certifying this information as a cabinet confidence. However, through the course of the hearings I learned that this overall percentage contemplates a negotiated one-time increase in FSC fishing access in the treaty context.

As discussed above, the Aboriginal FSC fishery receives priority access over the commercial and recreational fisheries in the harvest of Fraser River sockeye salmon. As the amount of fish allocated for FSC purposes increases, so too does the effect of this priority increase in terms of limiting fishing opportunities for the commercial and recreational fisheries. In the context of repeatedly low annual fish returns, a larger FSC allocation could mean that there will be fewer years in which the number of returning fish will be sufficient to allow for a commercial or recreational harvest opportunity after

conservation needs and FSC fishing allocations are met. Insofar as the percentage salmon allocation in the Aboriginal Fisheries Framework includes an increase over existing FSC harvest levels, and this increase results in fewer years in which the commercial and recreational sectors may harvest Fraser River sockeye, this new FSC allocation may have a significant impact on the sustainability of these fisheries.

Increasing the percentage of the fishery allocated to Aboriginal fishers also has the effect of decreasing the percentage that is available to the general commercial fishery. Although the transfer of fisheries access to Aboriginal groups is presently mitigated through voluntary relinquishment of commercial licences in the Allocation Transfer Program (ATP) and the Pacific Integrated Commercial Fisheries Initiative (PICFI), this mitigation provides relief only to the individual commercial fishers who have voluntarily relinquished their licences. It does not mitigate the effect of reallocation on the overall commercial fishing fleet or on the public. The result of the fisheries allocation transfer is that the commercial fishing fleet is reduced and there are fewer opportunities for the public at large to enter the commercial fishing industry. Insofar as the percentage salmon allocation in the Aboriginal Fisheries Framework contemplates a change in the overall composition of the fishery, this policy may also have an impact on the sustainability of the general commercial fishery.

The percentage salmon allocation contained in the Aboriginal Fisheries Framework has been certified as a cabinet confidence. However, I find that this new allocation has the potential to affect the sustainability of the Fraser River sockeye fishery, as well as the future commercial, recreational, Aboriginal, and public access to the fishery. I take the view that the underlying policy direction of Canada in relation to such allocation changes ought to be made clear and transparent to all fishing sectors and to the public, so that their concerns and livelihoods may be respected. DFO should develop any policy that may change inter-sectoral allocation of the Fraser River sockeye fishery, such as the Aboriginal Fisheries Framework, openly and collaboratively following a process such as Action Step 4.2 of the Wild Salmon Policy, discussed in Chapter 10, Wild Salmon Policy.

Minister's ultimate authority

In recent decades, DFO has also attempted to build a co-management relationship with First Nations through an assortment of fisheries policies and programs. However, DFO has offered varying descriptions of such a relationship and has at times provided inconsistent articulations of the minister's ultimate authority.

I find that DFO's inconsistent articulation of the minister's ultimate authority over fish conservation and fisheries management has contributed to a lack of clarity surrounding DFO's intentions for Aboriginal participation in fisheries management and, in some cases, has created an expectation that shared authority over the fisheries is likely.

The law currently provides that the ultimate authority over fish conservation and fisheries management rests with the federal minister of fisheries and oceans. For the reasons articulated in Volume 3, I am satisfied that any recommendations I make should be consistent with the ultimate authority of the minister. A discussion of the minister's ultimate authority and the role and funding of Aboriginal and non-Aboriginal participants in the strategic integrated planning process envisioned under Strategy 4.2 of the Wild Salmon Policy is discussed in Volume 3.

■ DFO reform initiatives in the management of the fisheries

Allocation of the commercial sockeye salmon fishery – share-based management

Definition of share-based management

Traditionally, the Pacific salmon commercial fishery has operated as a derby fishery. This model is not the only way of conducting a fishery and, in recent years, there has been interest in moving the commercial salmon fishery away from derby fisheries and toward share-based management (SBM).¹²²³ Under this model, catch shares are assigned to specific user groups or individuals, who then know in advance

how many fish they are allowed to catch and retain. A catch share provides a sector, licence area, gear type, or licence holder access to a pre-determined share of the total allowable catch (TAC).

A broad term, SBM refers generally to a system of fishery management that relies on catch shares, rather than the derby model that relies on openings and closings without a cap, or limit, on the number of fish that can be kept. SBM covers a number of different management structures or approaches. When catch shares are assigned to individual licences or vessels, they are often called “individual quotas,” or IQs. Share-based management systems can be designed so that shares or quotas are transferable: in that case they are referred to as “individual transferable quotas,” or ITQs. An SBM system may also restrict or prohibit transfers of shares within a particular licence area or gear type, or it may allow transfers among gear types or even fishing sectors (e.g., a transfer of TAC from the commercial to the recreational or the First Nations sectors).

History of Pacific Region share-based management in the commercial salmon fishery

Earlier in this chapter I discussed two reports released in 2004; first, the joint task group (JTG) report of Peter Pearse and Donald McRae, *Treaties and Transition: Towards a Sustainable Fishery on Canada's Pacific Coast (Treaties and Transition)*, and second, the First Nations Panel on Fisheries report, *Our Place at the Table*.¹²²⁴ Both reports examined the state of the Pacific fisheries and recommended reform. In response, DFO initiated the Pacific Fishery Reform,¹²²⁵ which is described in more detail in its *Discussion Paper on the Implementation of Pacific Fisheries Reform*.¹²²⁶

In the Pacific Fishery Reform discussion paper, DFO set out a “blueprint for reform” with four main themes, one of which was to improve “the economic performance of fisheries so that they reach their full potential, provide certainty to participants and optimize harvest opportunities.”¹²²⁷ The action plan for 2005 set out 10 separate measures, including that DFO

- Consult with Commercial Salmon Advisory Board on approaches to clarifying and confirming fleet shares within the commercial fishery.

- Conduct demonstration projects.
- Work with the Commercial Salmon Advisory Board and First Nations to develop an approach to defining harvest shares for commercial licenses for the purpose of transferring allocations to First Nations.¹²²⁸

DFO also said this in the discussion paper:

Ensuring resource conservation and supporting healthy, viable fisheries have been ongoing challenges for fisheries management in the Pacific region of Canada for more than a century ... In addition, the economic viability in some commercial fisheries has declined for a variety of reasons. Further, sharing of the limited available catch of some fish species like Pacific salmon among First Nations, recreational and commercial fishers has become extremely contentious leading to conflict over access to the fishery.¹²²⁹

The discussion paper noted that “virtually all of the analysis and recommendations provided by the [JTG] ... centered on the commercial sector” and that the specific recommendations of *Treaties and Transition* were “to move to long term (i.e. twenty-five year), personal, fully transferable, individual quota entitlements in all commercial fisheries.”¹²³⁰ It provided the following comments:

Defining Catch Shares

Under the present management system, the commercial harvest is generally assigned to the established commercial licence holders in the various fisheries. The distribution of the available commercial harvest and the related fishing opportunities between different commercial fishing groups, fleet sectors and among individual fishers within these fleet sectors varies between fisheries. In some instances (e.g. salmon and herring) explicit coast-wide “target” shares for the balance of the available harvest have been assigned by policy to different fleet sectors.

The JTG recommended that the individual quota approach be extended to all commercial fisheries. Under this recommendation each fishing licence in every commercial fishery would have an established quota share of the

Total Allowable Commercial Catch (TACC) associated with it.

One possible alternative to an individual quota approach is the distribution of long term quota entitlements to fleets or groups of fisheries collectively.

...

Transferability

Under the present management system, the degree of transferability of fishing opportunities varies dramatically ... In the case of the salmon fishery, licence eligibilities are only transferable upon [the] sale of the licensed vessel and only in conjunction with other licences associated with the vessel.

The JTG recommended that these present restrictions and inconsistencies be eliminated in favour of full transferability of quota licences.

The issues associated with commercial transferability are many and varied.

...

First and foremost, the option of prohibiting the transfer and sale of commercial licence eligibilities, or IQs where they are established is unrealistic.¹²³¹

In 2006–7, DFO retained a consultant to assist a subcommittee of the Commercial Salmon Advisory Board, the Sub-Committee on Options for Review and Evaluation (known as SCORE), to address future opportunities for the salmon fishery.¹²³² During the SCORE process, in July 2007 the minister announced the Pacific Integrated Commercial Fisheries Initiative (described above), which introduced a requirement for a share-based approach to managing Pacific salmon (thereby ending the debate over whether DFO would move toward a catch-sharing arrangement).¹²³³

In March 2008, DFO held an internal workshop on implementing share-based management and, in 2009, published a discussion paper, *Towards Share Based Management of the British Columbia Commercial Salmon Fishery* (SBM Discussion Paper), intended to “assist in further advancing reform of the commercial salmon Fishery in British Columbia.”¹²³⁴ This paper offered the following critique of the current allocation system:

In summary, the key deficiency of the present sharing system is that it does not provide the

certainty and security required by commercial harvesters to efficiently plan their fishing operations. This fuels competition and conflict between harvesters and harvesting groups over their harvest shares and undermines financial performance in the fishery. Also, the present sharing system does not provide sufficient flexibility to address the changing needs of the resource and society without significant conflict and controversy.¹²³⁵

The SBM Discussion Paper noted that the JTG report's recommendation for the immediate implementation of fully transferable individual fishing quotas contrasted with the recommendation of the First Nations Panel on Fisheries for a moratorium on new ITQ regimes until First Nations' interests in allocation were addressed.¹²³⁶ It also noted that "the complexity of salmon biology and the nature of commercial salmon fishing make it difficult to implement and apply a standardized 'one size fits all' approach to share based management of commercial salmon fishing."¹²³⁷ It concluded that "continuing and expanding the current demonstration projects in the fishery is clearly a key element of moving the transition forward."¹²³⁸ This impression – of a general commitment on the part of DFO to move toward SBM, but in a deliberate way that would not see DFO forcing abrupt and unwanted change on unwilling fleets – accords with the evidence from the hearings on this issue.

Indeed, during the hearings, I heard witnesses opine on the advantages and disadvantages, the merits and demerits, of a share-based management model. The discussion was often framed in terms of ITQs specifically, but the basic question is the choice between a share-based management model and a derby fishery management approach. It is not surprising that there are different views on whether DFO should move to SBM for the commercial salmon fishery and, if so, when and how.

Mr. Grout, salmon resource manager, DFO, spoke about the merits of SBM:

On the ITQ side of things, there's better precision in terms of management of the harvest because the individual licences are fishing to

a predefined share of the TAC. Each licence condition would specify a percentage share of the commercial TAC. Once the commercial TAC is announced, it's a simple calculation to determine how many pieces of salmon could be harvested. Once the licence holder had fished their allocation, they have to stop.¹²³⁹

Mr. Grout contrasted this system with "competitive derby fisheries" in which, "once the fishery was open, the vessels would be allowed to harvest unlimited amounts of the fish," which he considered "a relatively imprecise way of achieving a catch target."¹²⁴⁰ Under a share-based approach, he explained, "[o]nce the licence holder had fished their allocation, they have to stop fishing."¹²⁴¹

As I understood Mr. Grout's evidence, such improved precision for managers allows them to better protect stocks of concern and improves their ability to control the impact of a commercial fishery.¹²⁴² Rather than the blunt tools of opening or closing a fishery (allowing fishers to catch as much as possible during the opening), a share-based approach increases precision. It allows fishery managers to regulate the pace and the impact of commercial fishing, and thereby supports the department's complementary goals of conservation and a sustainable fishery.* Mr. Grout testified that, for fishery managers, "clearly our top priority ... is conservation of populations."¹²⁴³ Ms. Farlinger said that the department's view is that "[t]here certainly are conservation advantages to the share based fishery."¹²⁴⁴

In his testimony, Mr. Grout linked share-based management to the Pacific Fishery Reform initiative and described the department's objective of "looking to improve the conservation performance of the fisheries, consistent with the Wild Salmon Policy."¹²⁴⁵ In discussing the benefits of a share-based management model, which manages outputs rather than inputs, Mr. Grout testified as follows:

One of the themes around bycatch in these output controlled fisheries is [that] the fishery itself tends to be a slower pace, so it's not a competitive race for the fish. The openings can be longer, stretched through time. That allows

* The same point is made in two reviews by independent contractors of pilot projects involving ITQ demonstration fisheries, which are discussed in the section below. See Exhibit 465, p. 41, and Exhibit 467, p. 10.

the fleet to move away from areas or adjust to deal with bycatch issues and potentially reduce some of those variables, given that they're fishing more to a specific share and able to do it in a way that they're not racing against others.¹²⁴⁶

Mr. Grout described share-based management as being consistent with the goals of the Wild Salmon Policy:

The vision laid out in Pacific [F]ishery [R]eform in terms of the move towards share-based management would certainly provide or enable the fleets to meet some of those commitments around implementing the Wild Salmon Policy, especially around the fleets being more self-reliant, able to self-adjust.¹²⁴⁷

Mr. McEachern, who was one of the commercial fishing representatives who was in favour of implementing ITQs in the salmon fishery, noted that "the biggest advantage for the fishermen in a share based management is the ability to put more fish across your deck."¹²⁴⁸ This sentiment was echoed by Mr. Morley, vice-president of the Canadian Fishing Company:

[I]ndividual fishermen have benefited greatly in terms of increased income overall from moving to ITQs. In the salmon fishery this past year, the best example I can see is that when we did implement a pilot system for Areas B and H on Fraser sockeye ... with the kinds of markets and volumes we see in that, if we had not had the share based system for Area B and H, I would suggest to you that ... given the normal style of opening that the Department would have come in, we would not have harvested ... maybe 60 percent of what we did harvest.¹²⁴⁹

I heard from witnesses who did not support SBM for the commercial salmon fishery. Mr. Brown,

suggested that an ITQ-style model would face the challenge of a migratory species that is subject to ongoing, in-season estimation as to its size.¹²⁵⁰ He suggested that those communities that have the closest attachment to common property resources are best placed to manage it well.¹²⁵¹ He also told me that, in his opinion, the implementation of an ITQ system effectively creates individual property rights* out of a public resource.¹²⁵²

Ms. Scarfo, a commercial fisher, also commented about SBM models:

It is not one size fits all. The government knows it's not one size fits all. The government knows there are cons to this mechanism. They've recognized them ... If you are absolutely determined that ITQs are the only way to go for salmon in B.C., then why aren't we engaging in that discussion of how do you minimize the downsides that come with this?¹²⁵³

Along the same lines, although supportive of SBM, Mr. McEachern pointed out in his testimony that there will be "social ramifications" from a full move to SBM – in particular, that "some fishermen are no longer going to fish."¹²⁵⁴ Testifying on the same panel, Mr. Sakich, also a commercial fisher, pointed out the human impact of the management model employed for the commercial salmon fleet. He indicated that "the average age in the industry is absolutely ancient compared to any other workplace in Canada."¹²⁵⁵

I received the following submission at the public forum held in New Westminster, in which the presenter stated:

Access policies need, obviously, to juggle ecological sustainability needs with economic efficiency and social equity. Personally, I think individual transferable quota (ITQ) systems do this better for wild fisheries than most alternatives. I am aware that ITQ

* However, in a publication produced by the participant Watershed Watch Salmon Society, *Transferable Shares in British Columbia's Commercial Salmon Fishery* (Exhibit 9), author Terry Glavin (who also testified at the hearings), wrote:

There is much concern that transferable shares, particularly "individual quota" regimes, will unavoidably result in the privatization of fisheries resources. This is a myth ...

A commercial fishing licence is subject to conditions attached to the licence, and a licence is precisely that. It is a limited fishing privilege. It is not an absolute or permanent right. It is not property:

... A transition from a conventional limited entry fishery to a catch-share fishery causes no change to the legal status of the licence. The licence – along with the transferable catch shares attached to it – remains a limited fishing privilege, and not a property right. p. 17

systems have never seemed in the past to be appropriate to the salmon fisheries, but the politics of allocation of catch amongst vested interests are sometimes made, unjustifiably, I think, into fixed constraints on policy innovation.¹²⁵⁶

A commercial fisher who also spoke at the New Westminster public forum stated, “[I]n my mind[,] an ITQ system that allows harvesting stocks in the most discreet [*sic*] manner possible has to be implemented for all sockeye and other salmon stocks.”¹²⁵⁷

Fraser River sockeye commercial fishery demonstration projects

From DFO’s perspective, demonstration fisheries are a way to explore how best to implement elements of Pacific Fisheries Reform.¹²⁵⁸ There is now a small body of evidence that provides some understanding of how SBM models have worked for commercial salmon fishing, albeit in the context of limited size and duration and in demonstration fishing projects involving “willing fleets.” A number of individual quota (IQ) and individual transferable quota (ITQ) demonstration projects for salmon in the Pacific Region have been conducted in the past decade, two of which focused on Fraser River sockeye: the Area H Troll Pilot Studies (2002, 2003, and 2006) and the joint demonstration project in both Area B and Area H (2010).¹²⁵⁹ Demonstration projects involving IQs for Area H chum (2007) and Area B chum (2005), and projects involving ITQs for Area F chinook (2005–7), also provided information about implementing share-based management in the salmon fisheries.¹²⁶⁰

The 2002 pilot study in the Area H troll sockeye fishery involved only 10 vessels, and the parties agreed there were insufficient data to analyze and evaluate the project. The study continued in 2003, involving 25 vessels, and the quotas were not transferable. The 2003 Area H Study project was evaluated by Archipelago Marine Research Ltd., an independent contractor, which, among other things, concluded as follows:

- participants landed 74.1 percent of their allocation; 100 percent of the landings were

monitored; and landing data provided an accurate snapshot of the quota fishery activity, leading to confidence in management decisions;

- certainty from the quota fishery led to advance coordination of deliveries to primarily one buyer; and
- the IQ fishery generated “product self-promotion” as individual fish were tagged and traceable to the vessel of origin.¹²⁶¹

In 2006, another sockeye ITQ demonstration fishery was held in Area H, involving 73 of the 122 Area H licence holders (of the 73 licences, 64 were active licences that reported landings). In the review of this fishery by G.S. Gislason and Associates Ltd., an independent contractor, the conclusions included the following points:

- The “demonstration ITQ program met sustainability objectives with improved catch monitoring and adherence to the ITQ TAC; but the non-ITQ fleet exceeded their TAC—this is a concern and needs to be addressed in the future.”
- Quality “appears to have improved for ITQ fish.”
- “The ITQ fleet and some processors report[ed] that the ITQ fish was handled better and was superior quality, on average, to non-ITQ fish.”
- “Some ITQ fishermen slowed down the harvest per day and paid more attention to on-board handling.”
- Constraints to the ITQ program include that Fraser River sockeye must be caught in a short time frame due to concerns for weaker, Late-run stocks. Accordingly, the ITQ fishery for Fraser River sockeye does not get the benefit that other fisheries get from extending the season.
- The validation program “did not provide timely information to DFO for management purposes. This needs to be addressed in the future.”¹²⁶²

Concurrently with the SCORE process, representatives of the Harvest Committees for Areas B, D, and H met to discuss “the possibility of a joint project to test the feasibility, practicality and desirability of implementing share based ITQs.”¹²⁶³ After a balloting process, an ITQ demonstration project was planned for the 2008 sockeye fisheries in Areas B and H; however, very few vessels participated

because the TAC that year was relatively low (only 100,000 pieces for the entire commercial fleet, which translated into 281 pieces per licence in Area B and 135 pieces per licence in Area H). Gardner Pinfold, the independent contractor that evaluated these pilot projects, made a number of observations about the demonstration fisheries, including the points that follow:

- allocating the TAC to each licence gave “much better management control”;
- due to reduced TAC and small run size, the fishery might not have opened at all if not for the ITQ approach; and
- observers agreed that ITQ should help to reduce bycatch because fishermen can take the time to avoid areas of high bycatch; however, “this could not be observed under the short duration low run 2008 fishery.”¹²⁶⁴

In 2010, an ITQ demonstration fishery for Fraser River sockeye took place in both Areas B and H.¹²⁶⁵ Mr. Sakich described the Area H demonstration fisheries as providing “access ... economics ... fairness and ... respect.”¹²⁶⁶

State of share-based management in the commercial salmon fishery

In March 2009, DFO drafted a Strategic Plan for Salmon Share Based Management (SBM Strategic Plan).¹²⁶⁷ This plan espouses the following principles: conservation, consistency with treaties, integration, accountability, responsibility, equal share, and an incremental approach.¹²⁶⁸ It notes that “effective implementation of [share-based management] across all commercial fisheries will require buy-in from [the] licence holders.”¹²⁶⁹ The following key incentives are suggested as ways of building support for share-based management and demonstration fisheries: providing additional fishing opportunities through share-based management; providing the ability for the industry to self-adjust its fishing strategies based on the available catch and the marketplace; meeting catch-monitoring standards; and providing transfers to First Nations in a transparent manner.¹²⁷⁰ The SBM Strategic Plan sets out “Keys to Influencing Resistant Fleets,” including the following comments about two resistant South Coast fleets:

Area E – Potential fishing opportunities on small surpluses of all salmon species, particularly Chinook, may cause Area E harvesters to consider some form of SBM, as will the potential loss of access to Fraser sockeye due to ocean mixed stock concerns. Historical opposition to government policies on First Nation fisheries (e.g. pilot sales) makes this group resistant to changes like SBM that may reduce their numbers. Further, the part-time nature of this fishery makes it difficult to effectively use economic incentives.

Area G – This is a highly polarized fleet divided into those who believe that fishermen should have to actively fish their allocation to benefit and those who support an ITQ approach. The elected Area Harvest Committee is dominated by the former group and has rebuffed any attempts by the minority to discuss demonstration fishery options with DFO fishery managers, in spite of the results of the survey in Table 2. Reducing the size of this fleet through the Pacific Salmon Treaty mitigation program may cause this fleet to reconsider.¹²⁷¹

According to Mr. Grout, share-based management is a vision outlined in Pacific Fisheries Reform, and DFO is “looking for ways that [it] can move forward with identifying how share-based management can work for salmon.”¹²⁷² Mr. Grout recognized that there are a number of complexities affecting DFO’s implementation of share-based management in the salmon fishery, such as changing TAC through the season as well as the manner in which shares can be transferred among different fleets and sectors (e.g., to inland Aboriginal fisheries).¹²⁷³ However, Ms. Farlinger is optimistic that a move to share-based management in the salmon fisheries is one way to improve conservation:

There certainly are conservation advantages to the share based fishery. One of the challenges in the commercial salmon fishery is [that] it has been in many instances a mixed-stock fishery ... it limits access to some more abundant stocks in order to protect some of the stocks of concern, or weaker stocks. And for that reason, the fishery has been for 15 or 20 years moving closer into the river. One of the advantages of a share based fishery is then that those people

who ... because of gear, because of location, because of their own personal interest – have less access to the stocks, can then move their share around in the fishery ... it's not a panacea, it's not the answer to everything, but there are a number of both conservation and economic benefits to individuals who fish around the fishery. That doesn't mean it's perfect.¹²⁷⁴

Mr. Grout acknowledged that DFO has no firm deadline for the implementation of share-based management and that DFO has approached the implementation of these fisheries only with “willing fleets.”¹²⁷⁵ According to Ms. Dansereau:

[T]hese are pilots that we are testing here. We don't in this Department move quickly when we are changing the regime by which fishermen or fishing people function. We don't simply announce a change without having done a significant amount of work with them and make sure that we have a significant number of them in agreement with the approach.¹²⁷⁶

Participants have opposing views on the implementation of SBM and ITQs. The Seafood Producers Association recommends that DFO implement defined shares in all salmon fisheries within 12 months, and the Area D and Area B commercial fishers recommend that the commercial, recreational, and non-FSC Aboriginal fisheries move to a fixed defined share by 2015.¹²⁷⁷

The B.C. Wildlife Federation and the B.C. Federation of Drift Fishers submit that there are several issues that DFO needs to address before it implements share-based management – issues such as obstacles to inter-sectoral allocation.¹²⁷⁸ The Area G commercial troll fishers stated their opposition to the move to SBM and, in particular, ITQs in their submission:

The DFO policy to convert the fishery from a derby style fishery to an ITQ-based fishery is another example of a harvest management change without any socio-economic assessment in advance or any retrospective assessment after the event in those fisheries where it has been implemented. It appears to have become a pet policy of DFO for reasons of DFO convenience. It is clearly disadvanta-

geous from the point of view of fishers and coastal communities. It creates a financial instrument that can be traded on the market ... It adds a layer of expense to fishers who already struggle to meet expenses.¹²⁷⁹

The First Nations Coalition also expressed concern about moving to an ITQ regime for salmon fisheries because a similar move in other fisheries has “led to permanent change without adequate consultation or consideration of First Nations’ rights and interests.”¹²⁸⁰ This sentiment was echoed by the Stó:lō and the Cheam.¹²⁸¹

Findings

I heard evidence about the benefits of share-based management (SBM) over a derby-style management model for selective fishing. I am satisfied that share-based management serves conservation objectives and that the Department of Fisheries and Oceans (DFO) has committed to moving to share-based management for this legitimate reason. DFO recognizes that managing the entire commercial salmon fishery as a pure competitive derby model is not responsible or sustainable.

The evidence suggests an obvious tension in DFO's approach. It is, at a broad level, committed to moving to share-based management; its analysis of how to win over “resistant fleets” demonstrates that commitment. However, the department to date has elected to pursue a “soft” approach, relying on demonstration fishing projects with those fleets indicating a willingness to engage in a share-based management model. It has not pressed this new management structure on those unwilling to go along.

It is clear that DFO has not undertaken a suitable socio-economic analysis of the consequences of a full move to SBM for the Pacific commercial salmon fleet, and as a result, it does not fully understand the socio-economic impact this approach might have. Although some insights may be taken from consultants' reports describing a few SBM demonstration projects in recent years, those insights are partial and limited. They are not enough.

Although I recognize the limitations in the evidence before me regarding share-based management, there is in principle a sound basis for moving away from a pure derby fishery model and toward

share-based management. I cannot, however, on the evidence before me unequivocally endorse share-based management. Nor would I reject it. What is vital now is to understand the implications for commercial fishers of a full move to share-based management. It is critical that DFO conduct a socio-economic analysis before settling on what management model (or models) it should employ. In the meantime, it should not impose SBM on fleets that are not willing. Once it has completed the socio-economic analysis and developed an approach that accords with the principles and objectives of the Wild Salmon Policy, DFO should clearly and quickly communicate what it intends to do, and when, and see those commitments through.

I discuss these findings and any related recommendations in Volume 3 of this Report.

In-river demonstration fisheries

The words “terminal,” “near terminal,” and “in-river,” though often used interchangeably when discussing the Fraser River watershed, have different meanings. In this section, I use “in-river” to describe a broader category of fisheries occurring in the Fraser River watershed above Mission – fisheries that may include those occurring on the mainstem of the Fraser River. “Terminal” and “near terminal” are used to describe a more limited category of fisheries occurring on tributaries and lakes after sockeye split off from the Fraser River mainstem, with “terminal” fisheries occurring closest to the spawning grounds and usually targeting a single stock.

Historically, DFO has authorized the commercial fishing of Fraser River sockeye only in marine areas and in the Fraser River below Mission. Although these mixed-stock fisheries are primarily directed toward the most abundant stocks, they also affect less-productive (or weak) stocks that migrate at the same time as the abundant (or strong) stocks. Given this co-migration of strong and weak stocks, some have suggested that mixed-stock fisheries are not the optimal way in which to safeguard the genetic diversity of Fraser River sockeye salmon.

One model proposed to address this issue is the use of terminal fisheries. If not harvested in a mixed-stock fishery, Fraser River sockeye eventually separate into individual stocks as they migrate up

the river and split off toward their spawning grounds. The primary conservation benefit intended by terminal fisheries is the ability to be more selective in harvesting, thereby protecting weak stocks. It has been suggested to me that this model, by allowing for the protection of weak stocks, may increase the sustainability of Fraser River sockeye.¹²⁸²

DFO has expressed its intention to move a portion of the commercial Fraser River sockeye harvest to in-river locations and, in recent years, has authorized in-river commercial harvest (sometimes referred to as in-river demonstration fisheries) by First Nations’ organizations. The movement of commercial fishing effort inland, and the manner in which the department has gone about the transfer of allocation, has been controversial.

DFO’s decision to move commercial fishing effort in-river was explored at our hearings and was addressed by a number of participants in their submissions to me. Several participants were strongly supportive of shifting commercial fishing closer to terminal areas, both as a conservation measure and as a potential benefit to inland Aboriginal communities.

Canada took the position that the concept of conducting fisheries in-river is consistent with the objectives of the Wild Salmon Policy and the protection of weaker stocks. Moreover, in-river commercial fisheries, if demonstrated to be viable, could provide Aboriginal groups with economic and employment opportunities that did not exist previously.¹²⁸³

The Conservation Coalition supported the move to more terminal fisheries. It suggested that this change will advance implementation of the Wild Salmon Policy by avoiding over-exploitation of weak stocks.¹²⁸⁴

The First Nations Coalition took the position that terminal and near-terminal fisheries are beneficial to all because they support the protection of biodiversity needed to facilitate sustainable fisheries.¹²⁸⁵ The FNC suggested that, given the requirements for conservation and biodiversity, and the priority obligation of FSC fishing, there should be continued and improved efforts to explore and implement “terminal and near terminal river fisheries on known stocks in the coastal areas and Fraser watershed.” DFO should therefore continue to work with First Nations to develop capacity for conducting such fisheries.¹²⁸⁶

The Stó:lō Tribal Council and the Cheam Indian Band suggested that the FNC's recommendations related to known stock and selective fisheries could also be met by the fisheries conducted by First Nations in the Fraser River. They supported programs that would enable a transition to increased in-river fishing by First Nations.¹²⁸⁷

Other participants, however, expressed concerns about the prospect of shifting commercial harvesting to terminal areas. The Seafood Producers Association of B.C. urged me not to recommend a move to further upriver fisheries, pointing to what it views as the decreased value of fish caught in terminal areas and the importance of consistent catches for business viability. It is also concerned about the impact a move to terminal fisheries would have on economic opportunities for coastal First Nations and on Aboriginal people employed in the processing sector.¹²⁸⁸

The Area D Salmon Gillnet Association and the Area B Harvest Committee (Seine) took the position that DFO's desire to move to more terminal fisheries is "ill thought out" and makes little economic sense, noting several concerns such as the depreciated value of the fish and the impact of en route mortality.¹²⁸⁹ This submission was echoed by the West Coast Trollers Area G Association and the United Fishermen and Allied Workers' Union, which also raised concerns about the absence of "scientific analysis" of the impact a move to terminal fisheries would have. They took the position that commercial fishing in the marine areas is of greater economic value to Canada than commercial fishing in terminal areas.¹²⁹⁰

The Western Central Coast Salish First Nations raised concerns about the potential negative impact of a move to terminal fisheries on the fishing opportunities of First Nations situated in the marine areas.¹²⁹¹ The Laich-kwil-tach Treaty Society had concerns that a move to terminal fisheries would conflict with the historical and current reliance on the resource by coastal Aboriginal communities. It submitted that the costs and benefits of terminal fisheries must be further studied before any steps are taken to develop and implement a new terminal fisheries policy. In particular, it identified three main issues that need to be addressed: quality and value, ecological and economic sustainability, and socio-economic impact.¹²⁹²

In-river commercial fishing under the Aboriginal Fisheries Strategy

Before 1992, DFO authorized commercial fishing for Fraser River sockeye in marine and approach areas below Mission only. It also authorized fishing by First Nations in inland areas above Mission, but only for the purpose of personal consumption, not of sale.¹²⁹³

In 1992, following the Supreme Court of Canada's 1990 decision in *R. v. Sparrow*, DFO introduced the Aboriginal Fisheries Strategy (AFS), which included a commercial fishing component known as the Pilot Sales Program (described above). This program authorized communal fishing for the purpose of sale by several First Nations situated in the Lower Fraser River (the Musqueam, Tsawwassen, and Stó:lō).¹²⁹⁴ It was the first time that DFO had authorized commercial harvesting in the Fraser River above Mission (the Stó:lō fishery takes place in the area from Mission to Sawmill Creek).¹²⁹⁵

In 1993, as part of the AFS, DFO also began, under the Excess Salmon to Spawning Requirements (ESSR) policy, to authorize some harvesting of Fraser River sockeye in terminal areas. This policy authorizes the harvesting of "surplus" salmon that return to the spawning grounds in numbers that exceed the spawning capacity of a natural area or an enhancement facility.¹²⁹⁶ The ESSR policy directs that, where DFO identifies an ESSR surplus, the fish are made available on a priority basis to First Nations for unmet FSC needs, then to First Nations for sale, then to community groups for sale, and, lastly, to competitive tender for sale.¹²⁹⁷

ESSR fisheries are intended to be opportunistic rather than to create permanent fisheries in terminal areas. Under the ESSR policy, DFO is directed to eliminate or minimize the availability of ESSR surpluses, where possible, through FSC, commercial, or recreational harvesting.¹²⁹⁸ Because of the opportunistic nature of ESSR fisheries, there is no requirement for relinquishment of licences from the commercial fishery or for permanent shifts in allocations from marine to terminal areas.

The Allocation Transfer Program (ATP) was also included under the AFS in 1994.¹²⁹⁹ The ATP operates by purchasing and permanently retiring licences from commercial fishers and by transferring an equivalent commercial fishing licence or allocation to an Aboriginal group on a communal basis.¹³⁰⁰

Early research by DFO into the viability of terminal fisheries

The programs introduced under the AFS (Pilot Sales, ESSR, ATP) were not intended to establish new commercial fisheries in terminal areas. However, around the time DFO introduced the AFS, it also began to research the viability of in-river commercial fishing.

In 1994, DFO's Program Planning and Economics Branch completed a study* of the quality and financial viability of terminal fisheries targeting Late Stuart and Horsefly sockeye.¹³⁰¹ This study identified the issue of overharvesting weak stocks in marine fisheries and suggested that increasing the use of ESSR fisheries could potentially provide a solution to this "mixed stock problem."¹³⁰² It also identified a number of practical problems associated with ESSR fisheries, including the "marginal" quality of the fish caught in some of the fisheries.¹³⁰³ The findings from this study are discussed below. The study recommended that further work be done to develop a strategy for dealing with ESSR surpluses in the Fraser River watershed.¹³⁰⁴ It suggested that the next steps for developing such a strategy would be to address the following issues: identifying surpluses, developing feasible strategies for harvesting them, considering the effects of harvesting surpluses on co-migrating species, and determining the actual size of economic benefits of these fisheries.¹³⁰⁵ It recommended that these issues be addressed by holding a pilot-scale fishery and documenting the outcome.¹³⁰⁶

Pacific Integrated Commercial Fisheries Initiative

DFO did not expand ESSR fisheries after the 1994 study. However, in the early 2000s, with an increasing focus on conservation objectives, DFO considered the possibility of developing in-river commercial fisheries. This issue was addressed in a 2004 memorandum written by Mr. Bevan, then senior assistant deputy minister, Fisheries and Aquaculture Management (now Ecosystems and Fisheries Management):

With weak stock management, as required by [the *Species at Risk Act*], the [Wild Salmon Policy], and the precautionary approach, it appears there will be ongoing returns of sockeye stocks to the Fraser River that could be harvested in terminal in-river areas. Economic losses in marine fisheries could be offset or mitigated to some extent by the development of in-river fisheries. While this would be highly controversial, there is no biological reason for denying these opportunities.¹³⁰⁷

In this memorandum, Mr. Bevan acknowledged that there may be valid reasons for not pursuing in-river commercial fishing, including harvesting and marketability problems, but suggested that, "given the ongoing pressures to manage for weak populations[,] we cannot continue to forgo potential economic opportunities, simply for the sake of maintaining status quo allocations."¹³⁰⁸

In 2007, DFO began to support the transfer of commercial harvest to in-river demonstration fisheries through the Pacific Integrated Commercial Fisheries Initiative (PICFI) (discussed above). Its largest financial component (\$115 million) is directed to the acquisition of commercial access (licences and quota) from harvesters in marine fisheries, including the salmon fishery.¹³⁰⁹ Like the ATP, PICFI operated by purchasing licences from commercial fishers, on a voluntary basis, and then transferring an equivalent licence or allocation to an Aboriginal group.¹³¹⁰ In 2008, DFO indicated that 15 percent of the funding for relinquishment under PICFI would be used to acquire commercial access to salmon, with the remaining 85 percent applied to other fisheries (e.g., groundfish, shellfish, halibut).¹³¹¹ It also indicated that acquisition of salmon access would primarily be used to support commercial opportunities for in-river First Nations.¹³¹²

PICFI included a capacity-building element with total funding of \$12.5 million. This funding was intended to facilitate the development of First Nation-owned and -operated commercial fisheries enterprises, both in coastal and inland areas, recognizing that simply having access to commercial fishing opportunities would not guarantee long-term economic success.¹³¹³

* This study is co-authored by Kaarina McGivney, who later became the regional director of the Pacific Region Treaty and Aboriginal Policy and Governance Directorate and also testified at the hearings.

DFO's rationale for shifting commercial harvest to in-river locations under PICFI

Several witnesses discussed DFO's objectives in using PICFI funding to shift a portion of the commercial harvest into the river. According to Paul Sprout, former regional director general, Pacific Region:

[PICFI] is ... designed principally to transfer licenses from non natives to First Nations, and in doing so offset and actually improve conservation by reducing fisheries in areas where the stocks are more mixed, where there [are] more problems with the fisheries, in terms of conservation, transferring those opportunities to First Nations, typically more inward, and in some cases in the Fraser River.¹³¹⁴

Ms. Farlinger, the current regional director general, indicated that, by funding in-river demonstration fisheries, DFO was seeking to support conservation objectives by avoiding mixed-stock fisheries, to provide additional economic access to First Nations, and to test the feasibility of in-river fisheries as an economic exercise.¹³¹⁵ According to Ms. Stewart, while the shift to in-river demonstration fisheries under PICFI was intended to provide economic opportunities to First Nations and was related to the recent poor performance of the coastal fishery, the economic aspect was secondary to the primary motive of providing for a more sustainable way of fishing.¹³¹⁶ Mr. Rosenberger also told me that the shift to more terminal fisheries under PICFI is in keeping with an attempt to establish fisheries that are focused on broader Wild Salmon Policy principles and sustainability.¹³¹⁷

The choice of a voluntary buy-back program under PICFI was consistent with the principle of "fair transfer of fishing opportunity" adopted by DFO in 2005 under Pacific Fisheries Reform. Under this principle, any transfer of economic opportunities to First Nations would be accomplished through voluntary licence retirement.¹³¹⁸ Ms. Mijacika explained to me that an important benefit of buy-back programs such as PICFI and ATP is that they provide a willing buyer, where there might not otherwise be one, for commercial licence holders who want to retire their licences.¹³¹⁹

Acquisition of commercial access under PICFI and ATP

From 2007 to 2011, DFO spent \$14.6 million to acquire 157 salmon licences under PICFI, and \$4.8 million to acquire 56 salmon licences under the ATP.¹³²⁰ Ms. McGivney advised that, in this period, all the salmon licences acquired through PICFI, and some acquired through the ATP, were used to support in-river commercial fisheries by First Nations.¹³²¹

Ms. Stewart did not know the proportion of the commercial salmon fishery that the department intends to move inland through PICFI.¹³²² Ms. McGivney testified that DFO had no specific plan and that determining how many fish would be moved to inland harvest from marine harvest would be determined through "negotiation," though she did not specify who would be included in the process.¹³²³

Transfer of commercial allocations to in-river demonstration fisheries

Transferring a commercial allocation to an in-river location is complex. Because the composition of stocks is different with mixed-stock fisheries in marine areas and targeted fisheries in-river, it is not possible to transfer a commercial allocation directly from a marine to an in-river demonstration fishery.¹³²⁴ As a result, commercial salmon licences acquired by DFO are each treated as a "portfolio" of stocks, with different stocks being transferred proportionally to in-river demonstration fisheries.¹³²⁵ For example, if a particular sockeye stock (e.g., Chilko) accounts for 20 percent of the harvest under a commercial licence in a mixed-stock fishery, the equivalent of that 20 percent may be reallocated to a demonstration fishery in-river that targets Chilko sockeye.¹³²⁶ Mr. Rosenberger explained that the weak stock components of commercial salmon licences acquired by DFO, such as Cultus or Bowron stocks, would not be reallocated to in-river fisheries for conservation reasons.¹³²⁷

In-river demonstration fisheries conducted under PICFI

DFO has used PICFI funds to support several in-river demonstration fisheries conducted by

First Nations.* These fisheries have occurred in a number of locations in the Fraser River watershed, including the Thompson, Chilko, and Quesnel river systems, parts of the Lower Fraser River, the Harrison River, and the Fraser River near Lytton (Siska First Nation).¹³²⁸

Because of low returns, there were no in-river demonstration fisheries targeting Fraser River sockeye in 2007, 2008, and 2009.¹³²⁹ Mr. Huber testified that, in the years after PICFI started, “there just [weren’t] fish available” for harvest.¹³³⁰ However, some inland First Nations did conduct demonstration fisheries that targeted other species of salmon, including pink and chinook.

Mr. Rosenberger testified that harvesting has been “well below the desired outcomes” in many of the in-river demonstration fisheries attempted under PICFI. He noted that, for many in-river groups, the issue is “trying to figure where and how they want to fish,” and that increasing the capacity to harvest and improving the understanding of the workings of the gear are going to be “a growing experience.” According to Mr. Rosenberger, beach seining has proven fairly successful, although it has been challenging to find areas where it will work. He noted that a significant breakthrough occurred in 2010 with the harvest of nearly 200,000 sockeye by the Riverfresh Partnership in the Shuswap / Thompson area. This fishery involved operating a seine boat on a lake – something that, according to Mr. Rosenberger, had “never occurred in the history of the Interior.”¹³³¹

In 2010, the high returns of Fraser River sockeye allowed DFO to allocate 12–13 percent of the total allowable catch to in-river demonstration fisheries. Mr. Grout testified that the in-river groups were not able to harvest that amount of fish, but “in the future, there may be capacity developed to do that and/or interest for increased allocations.”¹³³²

Table 1.5.11 summarizes the results of in-river demonstration fisheries that targeted Fraser River sockeye in 2010.

Costs associated with conducting in-river demonstration fisheries

Ms. Stewart told me that DFO is seeking to identify business opportunities through PICFI which, in time, will stand on their own and provide reliable economic opportunities for Aboriginal communities.¹³³³ However, most, if not all, of the expenses of in-river demonstration fisheries (e.g., catch monitoring, administration, marketing, transportation, business planning) have been funded by DFO. Ms. Stewart explained that DFO has funded these fisheries in their “start-up phases,” but their continued funding is “an issue that needs to be addressed.”¹³³⁴ Mr. Masson indicated that currently there is no plan to pass on any of the costs of catch monitoring to Aboriginal organizations conducting communal commercial fisheries, although there has been some discussion of this possibility.¹³³⁵

Table 1.5.11 In-river demonstration fisheries targeting Fraser River sockeye, 2010

Aboriginal organization	Fishery location(s)	Catch
Chehalis and Scowlitz First Nations	Harrison River	11,298
Riverfresh Partnership (Secwepemc Fisheries Commission / Esh-Kn-am)	Kamloops Lake, Siska First Nation, Thompson River	193,713
UFFCA Partnership (Northern Shuswap Tribal Council and Tsilhqot’in National Government / Xeni Gwet’in)	Quesnel River, Quesnel Lake, Chilko River, and Chilko Lake	995

Source: Compiled using data from Exhibit 1274, pp. 9, 11.

* Demonstration fisheries are projects involving new ways to access salmon resources in a manner that improves economic performance in the fishery, increases economic access to fisheries resources by Aboriginal groups, and improves co-operation among harvesters while ensuring conservation of salmon stocks. See PPR 5, Harvest Management, p. 55.

Opportunities for non-Aboriginal fishers under PICFI

Although one of the objectives of PICFI is to “integrate” Aboriginal and non-Aboriginal commercial fisheries, the program, according to Ms. Stewart, does not contemplate providing non-Aboriginal people with access to in-river commercial fisheries.¹³³⁶ Mr. Bevan testified that, when PICFI was first designed, it was intended to allow commercial fishers to move in-river if they wished to do so, but “nobody’s interested in doing that at this point.”¹³³⁷ Ms. Farlinger confirmed that there has been “no explicit provision or request to provide access to non-Aboriginal fishers up the river.”¹³³⁸

Dr. Ronald Ignace of the Secwepemc Nation told me that he envisions in-river commercial fisheries being limited essentially to First Nations.¹³³⁹ Thomas Alexis of the Tl’azt’en Nation and Chief Fred Sampson of the Siska First Nation added that, by moving fisheries in-river, stocks may be rebuilt to a point where the marine fishery would be viable again, providing opportunities for other interests in addition to First Nations.¹³⁴⁰

Expiry of PICFI

The PICFI program was scheduled to sunset on March 31, 2012. In September 2011, Ms. Farlinger told me that DFO had not decided whether to pursue in-river commercial fisheries post-PICFI.¹³⁴¹ Ms. Stewart explained that several options were under consideration by DFO,* but she could not “speak to what the future will hold.”¹³⁴² She agreed that, if PICFI were cancelled, it would be a challenge to continue in-river commercial fisheries.¹³⁴³ She noted that funding is needed on an ongoing basis for the expenses of conducting in-river fisheries and for research on feasibility and marketing opportunities.¹³⁴⁴

In August 2010, DFO’s Evaluation Directorate completed a mid-term evaluation of PICFI that recommended, among other things, that PICFI continue to lead the move toward a terminal fishery, and, if resources are available, continue PICFI beyond its scheduled expiry.¹³⁴⁵ Ms. Farlinger testified that the recommendations in this evaluation were “generally useful,” but that DFO’s internal analysis

of PICFI is still ongoing and that no decision had been made on those recommendations.¹³⁴⁶

I have reviewed the report by the DFO Evaluation Directorate and find it to be of little assistance. The authors purport to have considered “multiple lines of evidence,” including interviews with internal and external “key informants,” and to have reviewed the relevant documents and literature.¹³⁴⁷ However, the report does not identify the key informants, documents, and literature reviewed by the authors, or even the authors themselves.

On terminal fisheries, the report states the following:

A move toward a terminal fishery would further the goal of an environmentally sustainable fishery by avoiding weak stocks, while the economic viability of the fishery could increase due to a move away from a competitive fishery as in-river allocations are made in a share-based fashion, because of opportunity for efficient capture technology that the concentration of salmon in their native streams affords, and because selectivity would permit optimal harvests of strong stocks. A trade-off on quality could be mitigated by innovative product development and marketing. Consultation with [First Nations] would facilitate the achievement of an optimal balance.¹³⁴⁸

This paragraph contains a number of optimistic assumptions regarding the benefits expected to arise from a shift to a terminal fishery. Unfortunately, these assumptions are not supported by any analysis in the body of the report.

I find this report to be inadequate as a basis for deciding whether DFO should continue to support a move toward terminal fisheries.

Management of a terminal fishery

Several witnesses discussed the impact that a move to in-river commercial fisheries could have on DFO’s approach to managing the fishery. When asked whether a shift to a terminal fishery would require a “sea change” in DFO’s approach to management, Mr. Rosenberger replied, “No, I think that change is already occurring.” He acknowledged, however, that

* I note that in the budget tabled in Parliament on March 29, 2012, the government proposes to provide “\$33.5 million in 2012-13 to extend the Atlantic Integrated Commercial Fisheries Initiative and the Pacific Integrated Commercial Fisheries Initiative.”

DFO needs to make adjustments to account for the transfer of commercial access to First Nations.¹³⁴⁹

Mr. Lapointe noted that DFO policies allowing for in-river fisheries have been in place since 1992. In his view, the Fraser River Panel has been able to cope with the implementation of those policies.¹³⁵⁰ Mr. Rosenberger explained that the Fraser River Panel, despite having jurisdiction under the Pacific Salmon Treaty to waters above Mission, has not exercised authority over in-river commercial fisheries.¹³⁵¹

I was told that researchers at Simon Fraser University (SFU) are developing an in-river management model, which Mr. Grout described as “much more complex.” The model would look at the migration of fish and how escapement objectives might be set for terminal areas, perhaps at the Conservation Unit level or even a finer-scale resolution.¹³⁵² The model differs from the Fraser River Sockeye Spawning Initiative model (see discussion above), and it is uncertain how the two models could be combined.¹³⁵³ Although the FRSSI model does not take into account where the harvest occurs or how it might be allocated, the in-river model might allow managers to differentiate in both these areas.¹³⁵⁴ Mr. Grout noted that the project is “still a work in progress.”¹³⁵⁵ DFO meets regularly with the SFU researchers but is not yet contemplating policy changes.¹³⁵⁶

Terminal fisheries as a conservation initiative

I heard from several witnesses that a terminal fishery could increase the sustainability of Fraser River sockeye by allowing for increased selectivity in harvesting abundant stocks while also protecting weak stocks. Mr. Bevan told me that shifting to a terminal fishery makes sense “from a conservation point of view” by allowing for targeted harvests on specific stocks.¹³⁵⁷ Mr. English, principal author of Technical Report 7, Fisheries Management, noted that a terminal fishery allows for “disaggregation,” providing a greater ability to manage returns of specific stocks.¹³⁵⁸

The commercial sockeye fishery in Bristol Bay, Alaska, offers an example of how a terminal fishery allows for selective harvesting. This fishery targets sockeye on their return migration to nine separate river systems, each of which flows directly into the ocean.¹³⁵⁹ As shown in Figure 1.5.15, the sockeye fishery in Bristol Bay is divided into five “fishing districts” named after the river systems associated with them. Two of the fishing districts (Nushagak and Naknek-Kvichak) target fish returning to multiple river systems.¹³⁶⁰

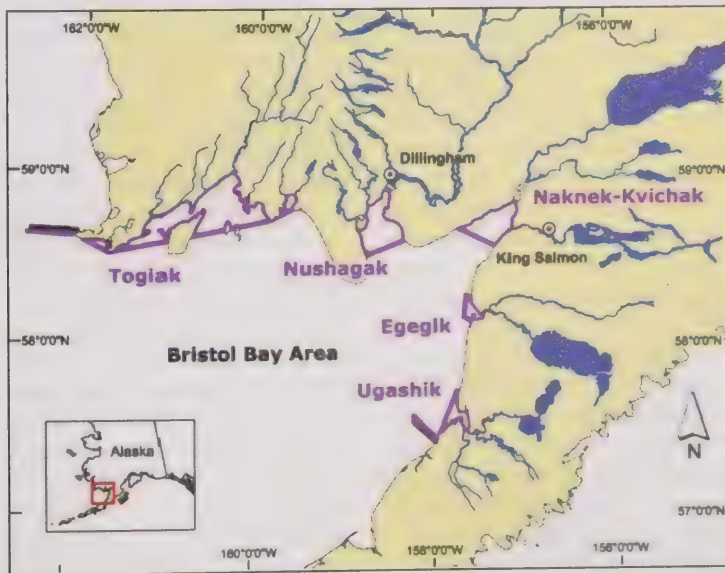


Figure 1.5.15 Map of Bristol Bay, Alaska, indicating the commercial fishing districts for sockeye salmon

Source: Technical Report 7, Fisheries Management, p. 129 (Exhibit 718).

The Bristol Bay fishery primarily occurs close to the mouths of the nine rivers, extending no more than 3 miles offshore.¹³⁶¹ Because only one or a few sockeye stocks return to each river, commercial fishers are able to harvest selectively either a specific stock or a limited selection of “known” stocks. It is therefore a terminal fishery, even though it occurs almost entirely in marine areas.

Because the geography of the Fraser River watershed differs substantially from that of Bristol Bay, I find the Bristol Bay example to be of only limited assistance. The most significant difference is that all the Fraser River sockeye stocks return to one river before splitting off toward their spawning areas.¹³⁶²

In order to increase selectivity in harvesting Fraser River sockeye, one must shift the location of harvesting to areas higher up in the Fraser River watershed.¹³⁶³ Gordon Curry, former fishery manager and Aboriginal affairs advisor, DFO, described the advantage of a terminal fishery for Fraser River sockeye as follows:

[A]s you move towards the spawning grounds you narrow the array of stocks or species down so that you can then become more selective as you get towards the terminal areas or, in essence, once you're on the spawning grounds, you're dealing with [one] stock of salmon ... So that's the ultimate in terms of being able to be very specific.¹³⁶⁴

Mr. Shepert described the benefits of harvesting farther inland this way: “The closer you catch them to [terminal areas], the more sustainable you can be. And that's what the First Nations have known for a long time. You can choose between males and females. You can let more females escape. You can take more males.”¹³⁶⁵

Although the ability to target stocks increases closer to terminal areas, I was told that fisheries conducted on the Fraser River mainstem can have a conservation benefit if they are far enough inland to avoid specific stocks of concern. For example, Dr. Brent Hargreaves, acting lead, Salmon Team, noted that Cultus Lake sockeye could be avoided if harvesting occurs after their “normal turnoff” at the Vedder River near Chilliwack.¹³⁶⁶ However, Mr. Curry cautioned that only a few stocks “branch off” from the Lower Fraser River,

while many travel a long distance up the Fraser River before branching off.¹³⁶⁷

Ms. Farlinger told me that one of the primary considerations in deciding where in-river commercial fisheries will take place is to reduce the impact of marine mixed-stock fisheries on weak stocks.¹³⁶⁸

Mr. Ken Wilson, a fisheries biologist, suggested that, if DFO is “convinced that a particular [large] escapement is hazardous to a particular salmon stock or CU” (see the discussion of large escapements in the escapement target section of this chapter), shifting harvest to the terminal area could potentially help to address that concern.¹³⁶⁹ I note, however, that if large escapements are to be avoided by terminal fishing, the capacity to harvest big volumes of fish in terminal areas must exist. An assessment of this issue would require consideration of the feasibility and the cost of establishing that capacity.

Socio-economic impact of the move to in-river commercial fisheries

Ms. Farlinger acknowledged that DFO has not formally studied the socio-economic impact of a move to in-river commercial fisheries.¹³⁷⁰ I did hear, however, from several witnesses about the potential impact of such a move on Aboriginal communities. Chief Sampson supports in-river commercial fisheries, suggesting that they provide “opportunities to those who are often the poorest of the poor in this province,” and that these benefits would be significant.¹³⁷¹ He supports DFO's licence buy-back programs as a “step in the right direction” to build up in-river fisheries that he hopes will become permanent.¹³⁷²

Rod Naknakim of the Laich-kwil-tach Treaty Society told me that members of his organization, who fish in marine areas, rely on the fishery for their livelihoods and fear that a terminal fishery “will push [them] right out of the industry.”¹³⁷³ Mr. Morley also noted the potential impact on First Nations in marine areas, explaining that, with respect to the Canadian Fishing Company's operations in Prince Rupert, Aboriginal people make up about 60 percent of the workforce employed at the cannery and 80 percent of the crew and skippers on vessels.¹³⁷⁴ According to Mr. Grout, because vessels and gear used for commercial harvesting in marine areas are also used for harvesting of FSC fish, some First Nations in those areas have raised

concerns that their ability to access FSC fish could be compromised if commercial licences held by Aboriginal harvesters are relinquished through buy-back programs.¹³⁷⁵

Economic viability of in-river demonstration fisheries

I heard evidence from several witnesses about two specific concerns relating to in-river demonstration fisheries: the availability of fish to harvest, and the quality and value of sockeye caught in terminal areas.

Availability of fish to harvest

Although the economic viability of any commercial fishery depends on having access to reliable returns of fish, this concern is particularly important for inland fisheries because of the high variability in returns from year to year.¹³⁷⁶ Mr. Grout explained that, for terminal fisheries for Fraser River sockeye, years with substantial numbers of sockeye available for harvest are followed by off-cycle years. For example, in the Thompson River system, the usual pattern is two strong years of sockeye returns followed by two relatively weak years.¹³⁷⁷ Mr. Rosenberger observed that it would be difficult to sustain a commercial fishery that occurs in only two of four years.¹³⁷⁸

Mr. Morley explained how variations in abundance have more serious consequences in a terminal fishery:

[T]he group who is fishing ... is relying on a single population. And if that population is reduced, their economic opportunities are reduced drastically, and they can't sort of say, "Okay, we're going to take conservation action on this population this year and we're going to, instead of harvesting Fraser sockeye we're going to concentrate on Barkley Sound sockeye or we're going to concentrate on chum salmon in Johnstone Straits," because they don't have that opportunity living in that one terminal area. So inherently the fishing activity is less economically sustainable.¹³⁷⁹

As a way to address the issue of variability, Mr. Rosenberger told me that DFO has encouraged inland First Nations to organize themselves into a larger co-operative or aggregate group. However,

he advised that "fairly limited progress has been made" on that issue.¹³⁸⁰

Mr. Morley also raised a concern about the impact of en route mortality on the availability of fish to harvest in terminal fisheries. He suggested that, because fish die from various causes (e.g., high temperatures) during their migration up the river, the total number of fish available to harvest would be lower in a terminal fishery than in a marine fishery.¹³⁸¹ I heard from Dr. Scott Hinch, a professor at the University of British Columbia, that en route mortality of Fraser River sockeye has been increasing (his evidence regarding en route mortality is also discussed in Volume 2, Chapter 4, Decline-related evidence). Since 1996, en route loss of at least 30 percent has been observed in at least one run-timing group each year.¹³⁸² In several of those years, en route loss was the dominant fate of the Early Stuart and Late-run groups.¹³⁸³

When asked whether en route mortality could reduce the harvest in the commercial fishery if fishing effort is moved in-river, Ms. Stewart responded that, because DFO is trying to limit harvesting of weak stocks in marine fisheries, a move to in-river fisheries might actually create fishing opportunities that otherwise would not have been available.¹³⁸⁴ Mr. Rosenberger noted the potential for terminal fisheries to increase the available harvest by enabling catches of strong stocks that would otherwise be forgone because of weak stock concerns in mixed-stock fisheries.¹³⁸⁵ Mr. English also told me that, if the goal is to reduce exploitation rates on some stocks while allowing some fisheries on all stocks, then a portion of the harvest could be taken in traditional ocean fisheries, with the surplus harvested in more terminal areas.¹³⁸⁶

Quality and value of sockeye caught in terminal areas

Ms. McGivney told me that, to her knowledge, the only investigation conducted by DFO directly into the quality of fish in terminal areas was the 1994 study discussed earlier in this section.¹³⁸⁷ According to this study:

There is controversy over the quality and value of terminally caught sockeye, especially Fraser River sockeye stocks. Commercial interests generally contend that in-river quality is so low

that sockeye have low or no value and that trying to market such low value catch would affect Canada's reputation for high quality products. Other, mainly Native, interests contend that in-river salmon quality is not necessarily bad. Natives have been eating fish caught from in-river areas for many hundreds of years and for some time have been selling these fish locally. So far, the positions of both groups are based on anecdotal information.¹³⁸⁸

The covering memorandum for the study suggests that, given the controversial nature of the topic, "it is important to gather relevant information (e.g. quality and value of fish at various locations) and make it generally available to facilitate an informed debate."¹³⁸⁹

The methodology for the study involved harvesting Horsefly and Late Stuart sockeye at three locations (Tachie River, Quesnel River, Horsefly River) over a four-week period in September 1993. The fish were transported to Vancouver, where a portion of the fish was processed into canned and smoked products, as well as roe products.

DFO staff evaluated the quality of the fresh and processed products through sensory and chemical analysis. They found that, while the quality of the products met DFO's minimum standards for sale, it was below that of comparable commercial products. The smoked products most closely resembled current commercial products, but the texture was grainy and chewy, and in many cases the products were very thin. The fresh fish was designated as "utility grade," with attributes typical of Late-run or sexually mature fish – heavily watermarked and covered with slime. The canned product also had attributes associated with Late-runs, including watermarks, soft texture, and considerable variation in flesh colour. The roe was acceptable for commercial sale but of "very low quality."¹³⁹⁰

Based on these findings, the authors of the study researched potential marketing opportunities for the various products and concluded that they would not meet the requirements of many of the commercial markets into which sockeye are traditionally sold. They identified potential markets for a caviar product in Japan or Germany and for certain smoked products in Canada, if the products were offered at discount prices, but did not identify any marketing opportunities for the fresh or canned products.¹³⁹¹

According to the report, the results are specific to Horsefly and Late Stuart stocks and would not necessarily apply to other sockeye stocks, but they "provide a benchmark of information that may be indicative of the possible outcomes in some other fisheries for stocks with similar timing."¹³⁹² At the hearings, Ms. McGivney referred to the results of this study as "very preliminary."¹³⁹³

I find this study helpful, in particular its analysis of the quality of sockeye caught in terminal fisheries. The analysis of marketing opportunities is less useful because it is now outdated.

Several witnesses also told me that the quality and value of fish caught in terminal and near-terminal areas is lower than fish caught in the marine areas.¹³⁹⁴ Mr. Morley related his view that in-river fisheries are less profitable than marine fisheries because "the market opportunities for the fish [caught] upriver are much more limited" and "the quality of the flesh ... provides fewer options in terms of products."¹³⁹⁵ He referred me to a 2006 study prepared by Stuart Nelson, under the direction of the BC Seafood Alliance, which examined the Fraser River sockeye fishery from a business perspective and compared the quality and value of fish caught in different locations, including in terminal areas.¹³⁹⁶ In completing this report, Mr. Nelson relied on a number of sources, including:

- financial data and market information derived from interviews with industry participants;
- reports on the seafood business in British Columbia and in other jurisdictions;
- fishery information derived from DFO publications and interviews; and
- the knowledge and the experience of the author.¹³⁹⁷

I note that the report does not provide names of the interviewees, nor does it list the other sources of information relied on by the author.

In this study, Mr. Nelson describes the physiological changes experienced by Fraser River sockeye as they migrate toward terminal areas:

During the Fraser sockeye's journey upriver ... the attributes of the fish change. No longer feeding, and battling against the rivers' flows, sockeye are fuelled by built-up stores of energy (fat, oil, muscle). Skin thickens, and colour

changes from bright blue-silver to duller shades of red-grey. Fish lose body weight, and reproductive organs comprise a growing portion of the sockeye's mass. Some of the red pigment in the flesh is transferred to the skin and eggs, making the flesh paler. As muscle is spent, and energy consumed, flesh becomes softer, and belly-walls thinner. Sockeye arrive at the spawning grounds substantially spent.¹³⁹⁸

Mr. Nelson suggests that vivid flesh colour is a "vital attribute" for salmon customers, and other "premium" attributes include firm flesh texture, bright skin colour, and high oil / fat content.¹³⁹⁹

It is evident that as sockeye proceed through their migration, they possess fewer of the attributes that are prized by the marketplace. Reduced market attractiveness implies a lower commercial value. It follows that a harvest-mix as heavily weighted to ocean-caught Fraser sockeye as possible offers the best prospects for "giving customers what they want."¹⁴⁰⁰

Using a financial model, Mr. Nelson calculated profits to harvesters under three capture locations (ocean, estuary, or terminal), based on the assumption that the entire harvest is directed to one capture location. His calculations purported to show that profits to harvesters from ocean-caught sockeye are three to 10 times higher than from terminally caught sockeye.¹⁴⁰¹ Mr. Nelson did not testify at our hearings, so I find it difficult to assess the reliability of his results.

Taking a different view of the issue, Mr. Shepert told me that the difficulty with marketing terminally caught sockeye has more to do with perceived rather than actual quality. He believes that marketing opportunities for terminally caught sockeye would increase if consumers understood the conservation benefits associated with terminal fisheries.¹⁴⁰² Mr. Shepert referred me to a study he completed in 2010 on marketing opportunities for fish caught by Aboriginal organizations in the Upper Fraser River.¹⁴⁰³ For this study, the Upper Fraser Fisheries Conservation Alliance produced value-added salmon products, including cold-smoked lox and dry- and hot-smoked salmon. Mr. Shepert provided the products to six potential buyers in the Lower Mainland (representatives of restaurants, hotels,

and grocery markets), who completed a survey.¹⁴⁰⁴ At the hearings, Mr. Shepert shared his view on the results of this work:

What we're talking about here is the market-ability of the products. And the products that we have been able to generate in the Upper Fraser have been excellent. I've taken them to some of the finest places here in Vancouver: Choices, Meinhardt. It's all in the report. But we went around and ... we might not be able to compete toe-to-toe in terms of the lox market. That's kind of sewn up. But we've developed a dry and hot-smoked [product] and putting them into Cryopacs. We've had incredible response from hotels and hotel chains that would love to have something like that to put in their gift baskets to give away. They were asking, "When can we buy this product?" Well, we were just doing the market surveys so I found that at Meinhardt and Choices, the feedback was incredible and positive in terms of, yes, we can market these products, no problem, particularly knowing that they're more sustainable.¹⁴⁰⁵

Mr. Shepert's report suggests potential marketing opportunities for one particular product, dry- and hot-smoked salmon. I note, however, the limited scope of the survey and, in addition, that there is no analysis of the potential size of the market.

Evaluation of in-river demonstration fisheries conducted under PICFI

Ms. Farlinger said that the in-river demonstration commercial fisheries funded by PICFI "are still under evaluation as pilots."¹⁴⁰⁶ According to Ms. Stewart, "during the period that PICFI has been in place ... there were limited commercial opportunities in those terminal fisheries. So the ability to ... assess viability has been somewhat limited."¹⁴⁰⁷ Ms. Farlinger told me that DFO is continuing to assess whether the fish could be harvested in a way that not only avoids the capture of other stocks but ultimately allows the fisheries to be profitable.¹⁴⁰⁸

Neither Ms. Farlinger nor Ms. McGivney could direct me to any study or analysis by DFO of the economic viability of in-river demonstration

fisheries conducted under PICFI, or to any assessment by the department of any conservation benefits achieved by these fisheries.¹⁴⁰⁹ I was, however, referred by DFO witnesses to two reports completed by Aboriginal organizations which addressed the financial outcomes of in-river demonstration fisheries conducted under PICFI. A report by the Okanagan Nation Alliance (ONA) reviews the results of the demonstration fisheries it conducted in 2010 targeting sockeye from the Columbia River system. The ONA caught a total of 1,067 sockeye in three fisheries: Osoyoos Lake seine; Okanagan Falls gillnet; and Osoyoos Lake troll.¹⁴¹⁰

The fish were sold to local customers in the Southern Okanagan region in various forms, including fresh whole sockeye and frozen sockeye. Some of the fish were processed into Indian candy (a traditional form of smoked salmon) and given to customers as samples for marketing purposes.¹⁴¹¹ At present, there is no fish-processing facility in the Okanagan, so the frozen fish and the Indian candy were processed at other locations (Siska and Maple Ridge) and shipped back to the Okanagan.¹⁴¹²

Table 1.5.12 shows the financial results of the demonstration fisheries, indicating that all three of the fisheries suffered losses.¹⁴¹³

Table 1.5.12 Results of demonstration fisheries conducted by Okanagan Nation Alliance, 2010

	Seine fishery	Troll fishery	Gillnet fishery
Sockeye caught	686	62	319
Sales	\$10,863	\$629	\$13,400
Costs	\$27,018	\$9,477	\$13,717
Total losses	(\$16,156)	(\$8,848)	(\$317)

Source: Compiled using data from Exhibit 1424, p. 18.

The report concludes, that based on 2010 market conditions and production costs, a break-even point could be reached with minimum harvests of 2,300 sockeye (seine), 1,500 sockeye (troll), and 800 sockeye (gillnet).¹⁴¹⁴

Ms. Stewart explained that the ONA is still working on market development and that the losses “reflect the fact that this is very early days in

a start-up operation.”¹⁴¹⁵ Mr. Rosenberger told me that many of the fish were sold to restaurants and high-end markets and that the ONA had reached an agreement with a significant restaurant chain in British Columbia to feature these fish.¹⁴¹⁶

A report prepared by the Secwepemc Fisheries Commission (SFC) describes the results of demonstration fisheries it conducted in 2007.¹⁴¹⁷ The SFC harvested a total of 10,697 pink salmon and 144 chinook in four fisheries: Thompson River gillnet, Thompson River angling, Kamloops Lake gillnet, and Thompson Lake beach seine. Only the latter two fisheries were successful in harvesting the target fish.¹⁴¹⁸

In the beach seine fishery, the SFC harvested a total of 95 chinook and 10,967 pink salmon over four and a half days, at a cost of approximately \$10,000.¹⁴¹⁹ The pink salmon were sold directly to a fish buyer / broker on site for \$8,068.75. This purchaser also took the chinook but did not pay anything for them.¹⁴²⁰ According to the report, the beach seine fishery could be profitable on the fifth night if production increased to 2,000 pinks per day, or on the second night if the SFC were able to sell the chinook.¹⁴²¹

In the gillnet fishery at Kamloops Lake, the SFC caught a total of 45 chinook over a three-day period at a cost of approximately \$3,000.¹⁴²² The SFC operated a fish market, where it offered for sale 613 pounds of chinook (fresh and frozen). Of this, it sold 208 pounds of fish at an average price of \$2.69 per pound, for total sales of \$560.¹⁴²³ The report concluded that “the fish market could never approach profitability” with these sales levels but indicated that a break-even point could potentially be reached after eight days if sales could be tripled and the price were increased to \$4.00 per pound.¹⁴²⁴ However, the report also noted that the prices were thought to be too high by some customers and recommended that prices at temporary fish markets be set much lower.¹⁴²⁵

When asked about these results, Ms. Stewart explained that the SFC fisheries are in “early days” and that those involved are still exploring what kinds of products are marketable and looking for ways to streamline and improve production.¹⁴²⁶ She noted that the SFC had been working strenuously at identifying how that fishery could be operated in a profitable manner.¹⁴²⁷

Findings

The transfer of commercial fishing allocation to in-river demonstration fisheries under PICFI

From 2007 to 2011, the Department of Fisheries and Oceans (DFO) spent \$14.6 million through the Pacific Integrated Commercial Fisheries Initiative (PICFI), as well as additional money through the Allocation Transfer Program (ATP), to acquire salmon (not just sockeye) licences for the purpose of transferring allocations to a number of in-river demonstration fisheries. It also provided funding through PICFI to support the development of Aboriginal businesses and to cover costs associated with conducting the demonstration fisheries. Although I commend DFO for exploring ways to conduct more sustainable fisheries and support economic development for First Nations, I have concerns about the way it has done so under PICFI.

First, before launching into such a costly program, in my view DFO ought to have conducted preliminary research. I note that, aside from one study in 1994, DFO witnesses could not point me to any pre-PICFI analysis of such basic matters as the quality and marketability of terminally caught fish.¹⁴²⁸

Second, despite the scale of DFO's investment in establishing in-river demonstration fisheries under PICFI, its evaluation was ad hoc. As of the time of our hearings, only a few months before the end of the initiative, DFO had not evaluated the economic viability, socio-economic impact, or conservation benefits of these fisheries, nor was there a process in place to do that evaluation. The department's mid-term evaluation of PICFI in 2010 relied on a problematic methodology and did not include any analysis to support its findings. As a result, despite having funded several demonstration fisheries through PICFI over a five-year period, including three fisheries targeting Fraser River sockeye in 2010, I find that DFO is not in a position to make an informed decision as to the desirability of continuing the shift to in-river commercial fishing through PICFI.

Conservation benefits

In theory, because of their selective nature, terminal fisheries have the potential to assist DFO in meeting its conservation objectives for Fraser River sockeye.

However, I was not directed to any analysis of the conservation benefits expected to arise from a shift to a terminal fishery for Fraser River sockeye. I find that DFO has not done the work necessary to assess or quantify actual conservation benefits from a shift to harvesting in-river or in terminal areas.

The evidence before me suggests that DFO has, for the most part, met its conservation objectives with its current in-season management process for the marine mixed-stock fishery. In 2007, 2008, and 2009, years with very low returns, DFO and the Fraser River Panel did not open a commercial fishery, even where these returns were unexpected based on pre-season forecasts. In those years, because no commercial harvesting took place at all, transferring allocations to terminal fisheries would not have resulted in higher returns of weak stocks.

The evidence also suggests to me that DFO has been relatively successful in meeting in-season escapement targets. Looking at all Fraser River sockeye stocks on an aggregate basis, I observe that DFO has been able to achieve in-season targets for gross escapement (the number of fish estimated to have migrated past the Mission hydroacoustic facility) in most of the years after 1990 for which data are available.¹⁴²⁹ It has been less successful in achieving in-season targets for net escapement (the number of fish estimated to have returned to the spawning grounds), but has come relatively close to meeting those targets in a number of years.¹⁴³⁰

Barry Rosenberger, area director, BC Interior, DFO, explained that most of the harvesting in the commercial fishery occurs around the peak of the run, allowing DFO to adjust harvest levels based on the most accurate run size estimates.¹⁴³¹ With the peak of the run, the uncertainty in the Pacific Salmon Commission's estimates of run size is greatly diminished.¹⁴³²

Economic viability

Although the evidence of economic viability is limited, I find it sufficient to conclude that DFO should proceed cautiously before devoting additional resources to support in-river demonstration fisheries. There is no evidence before me of an in-river demonstration fishery operating profitably. The two evaluations of specific in-river demonstration fisheries conducted by Aboriginal organizations disclosed significant financial losses. I also

heard that most of the costs of the in-river commercial fisheries conducted under PICFI have been subsidized by DFO and that ongoing funding from DFO would be required to support those fisheries.

In addition, serious questions were raised about the quality, value, and marketability of terminally caught sockeye, as well as the availability of fish in terminal areas. The best evidence before me on the issue of quality is DFO's 1994 study, which found that the quality of products from Late Stuart and Horsefly sockeye caught in terminal areas was significantly lower than comparable commercial products.¹⁴³³ I am satisfied, on the whole of the evidence, that, at present, sockeye caught in marine fisheries are significantly more valuable than sockeye caught in terminal or near-terminal fisheries. Given this finding, it appears to me that it will be challenging, and potentially costly, to develop markets for terminally caught sockeye.

The future of in-river demonstration fisheries

The evidence before me is not sufficient to decide whether DFO should continue to transfer Fraser River sockeye commercial allocation to in-river

fisheries. In reaching such a decision, the department should focus on assessing the extent to which such a shift would assist in achieving its mandate of ensuring the sustainability of the fishery. Claire Dansereau, deputy minister, was unable to say whether funding currently directed at increasing in-river commercial fisheries could be used more effectively for other conservation-related purposes, such as habitat monitoring or marine research.¹⁴³⁴

Implementing an in-river economic fishery is especially challenging for Fraser River sockeye for two reasons: first, the geography of the Fraser River watershed, with many different stocks returning to the same river; and second, the historical fact that the commercial fishery has taken place in marine and approach areas. Given these challenges, the complex issues involved in shifting commercial harvest to in-river areas must be carefully considered. I find that such issues should be considered within the integrated strategic planning process contemplated under Action Step 4.2 of the Wild Salmon Policy.

I discuss these findings and any related recommendations in Volume 3 of this Report.

Notes

- 1 The information in this chapter is based on oral testimony and exhibits tendered during the evidentiary hearings; Cohen Commission Policy and Practice Report (PPR) 4: Pacific Salmon Treaty; PPR 5: Harvest Management; PPR 6: Commercial Sector Licensing; PPR 7: Recreational Fishery; PPR 12: Catch Monitoring; PPR 18: Aboriginal Fisheries; and Cohen Commission Technical Report 7: Fisheries Management (Exhibit 718).
- 2 PPR 5, paras. 37–44.
- 3 Transcript, January 18, 2011, p. 28; see also PPR 5, paras. 38–39.
- 4 Transcript, February 10, 2011, p. 13.
- 5 Exhibit 8, p. 38.
- 6 Exhibit 143, pp. 276–80.
- 7 Exhibit 65.
- 8 PPR 4, p. 13; Exhibit 75, Appendix A.
- 9 PPR 5, para. 291.
- 10 PPR 5, paras. 3–4.
- 11 PPR 5, para. 292.
- 12 Exhibit 75, Appendix A, p. 6.
- 13 Transcript, November 8, 2010, pp. 4–5.
- 14 Exhibit 75, p. 60.
- 15 Mike Lapointe, Transcript, November 8, 2010, p. 10.
- 16 Exhibit 75, Appendix A, p. 7.
- 17 Exhibit 65; PPR 4, FN 6.
- 18 Exhibit 65, Article 1, para. 6.
- 19 Transcript, November 8, 2010, p. 16.
- 20 PPR 4, p. 4.
- 21 Exhibit 75, p. 321.
- 22 Exhibit 65, Article II, para. 12.
- 23 Exhibit 65, Article II, para. 6.
- 24 Exhibit 65, Article II, para. 3.
- 25 Transcript, November 8, 2010, p. 13.
- 26 Exhibit 65, Article II, para. 19.
- 27 Exhibit 65, Article VI, para. 6 and Annex IV, chap. 4, paras. 5 and 12; Transcript, November 8, 2010, p. 28.
- 28 Exhibit 74, p. 5.
- 29 Pat Matthew, Transcript, February 1, 2011, p. 71.
- 30 Transcript, November 8, 2010, p. 26; Transcript, January 17, 2011, p. 91; PPR 4, p. 24.
- 31 Barry Rosenberger, Transcript, January 17, 2011, p. 91.
- 32 Exhibit 65, Annex IV, chap. 4, para. 9.
- 33 See PPR 4, pp. 27–28.
- 34 Exhibit 65, Annex IV, chap. 4, paras. 13(a)–(d).
- 35 See PPR 4, pp. 18–19.
- 36 Exhibit 65, Article IV, para. 3.
- 37 Exhibit 65, Article IV, para. 7.
- 38 Exhibit 65, Article IV, paras. 1–2; see also Exhibit 338, an example of these reports.
- 39 Exhibit 65, Article IV, para. 6.
- 40 Exhibit 65, Article VI, paras. 2 and 5.
- 41 Exhibit 65, Annex IV, chap. 4, para. 4.
- 42 Transcript, November 8, 2010, pp. 14–15.
- 43 Exhibit 65, Annex IV, chap. 4, para. 12.
- 44 Exhibit 74, pp. 53–54.
- 45 Claire Dansereau and Susan Farlinger, Transcript, November 1, 2010, pp. 24–25.
- 46 PPR 5, paras. 12–36 and 291–97.
- 47 PPR 5, paras. 15–16.

- 48 PPR 5, paras. 23–26.
- 49 PPR 5, paras. 17–22; see also Transcript, January 17, 2011, pp. 13–14, and Transcript, January 17, 2011, p. 55.
- 50 Exhibit 1221.
- 51 PPR 5, paras. 27–28.
- 52 See PPR 6, paras. 1–59.
- 53 *Fisheries Act*, RSC 1985, c. F-14, as am, s. 7 (*Fisheries Act*)
- 54 *Fisheries Act*, ss. 8 and 9.
- 55 *Fisheries Act*, s. 43(f) and (g).
- 56 *Fishery (General) Regulations*, SOR/93-53.
- 57 *Fishery (General) Regulations*, SOR 93-53, s. 3(5).
- 58 *Pacific Fishery Management Area Regulations*, 2007, SOR/2007-77.
- 59 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332.
- 60 *Aboriginal Communal Fishing Licences Regulations*, SOR 93/332, s. 2.
- 61 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332, s. 3(1)(d) and 3(2).
- 62 *Pacific Fishery Regulations*, 1993, SOR/93-54.
- 63 *British Columbia Sport Fishing Regulation*, 1996, SOR/96-137.
- 64 *Fisheries Act*, RSBC 1996, c. 149, as am, s. 8.
- 65 *Wildlife Act*, RSBC 1996, c. 488, as am, s. 12.
- 66 Transcript, March 15, 2011, pp. 35–36.
- 67 See PPR 6, para. 26.
- 68 Transcript, March 15, pp. 61, 70–71.
- 69 Transcript, March 15, 2011, p. 36.
- 70 Chris Ashton, Transcript, February 22, 2011, p. 18.
- 71 See PPR 6, para. 10.
- 72 Transcript, March 15, 2011, p. 62.
- 73 Transcript, February 23, 2011, p. 67.
- 74 *Pacific Fishery Regulations*, 1993, SOR/93-54, Schedule VI.
- 75 Transcript, February 23, 2011, p. 67.
- 76 Transcript, February 23, 2011, pp. 72, 78–79.
- 77 Transcript, February 23, 2011, pp. 77–79.
- 78 Lisa Mijacika, Transcript, March 15, 2011, pp. 74–75, 97; see also PPR 6, pp. 15–16.
- 79 Transcript, March 15, 2011, pp. 67–68.
- 80 Transcript, March 15, 2011, pp. 68, 75.
- 81 Transcript, March 15, 2011, p. 75.
- 82 Transcript, March 15, 2011, p. 76.
- 83 Exhibit 1270, p. 2; PPR 18, p. 6.
- 84 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332, s. 4(2).
- 85 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332, s. 4(3) and 4(4).
- 86 Transcript, March 15, 2011, p. 72.
- 87 Transcript, March 15, 2011, pp. 72, 97–98.
- 88 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332, s. 5.1.
- 89 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332, s. 5.1.
- 90 Exhibit 261.
- 91 Exhibit 261, p. 6.
- 92 Exhibit 1741, s. 1.1.
- 93 Exhibit 1741, s. 2.0.
- 94 Exhibit 1741, s. 2.0; Transcript, September 2, 2011, p. 26.
- 95 Exhibit 1741, s. 3.0.
- 96 Exhibit 1741, s. 3.4.
- 97 Exhibit 1741, s. 4.1.
- 98 Exhibit 1741, s. 4.2.
- 99 Exhibit 1270.
- 100 Exhibit 1270, p. 1.
- 101 Exhibit 1270, p. 2.
- 102 Exhibit 1270, pp. 3–4.
- 103 Transcript, July 5, 2011, p. 2; Exhibit 261, p. 2.
- 104 Exhibit 1229, p. 2; see also Exhibit 261, p. 7.
- 105 Transcript, July 5, 2011, pp. 3–4.
- 106 *British Columbia Sport Fishing Regulations*, 1996, SOR/96-137, s. 18; see also PPR 7, paras. 31–44.
- 107 Deborah Sneddon, Transcript, March 3, 2011, p. 43; Jeremy Maynard, Transcript, March 7, 2011, p. 70.
- 108 Devona Adams, Transcript, March 3, 2011, pp. 42–43; Jeremy Maynard, Transcript, March 7, 2011, p. 69.
- 109 *British Columbia Sport Fishing Regulations*, 1996, SOR/96-137, ss. 16–17.
- 110 Exhibit 517.
- 111 Exhibit 518.
- 112 *British Columbia Sport Fishing Regulations*, 1996, SOR/96-137, s. 17.
- 113 Exhibit 517, p. 3.
- 114 Gerry Kristianson, Transcript, March 7, 2011, p. 13.
- 115 Gerry Kristianson, Transcript, March 7, 2011, p. 13; see also Transcript, March 2, 2011, p. 11.
- 116 *User Fees Act*, SC 2004, c. 6.
- 117 Devona Adams, Transcript, March 2, 2011, p. 11, and March 3, 2011, p. 17; Transcript, February 1, 2011, p. 18; see also Brian Riddell, Transcript, February 3, 2011, p. 58.
- 118 PPR 5, paras. 164–68.
- 119 Exhibit 318; see also Transcript, January 17, 2011, p. 9.
- 120 Exhibit 295, p. 6.
- 121 Exhibit 295, p. 6.
- 122 Exhibit 295, p. 6.
- 123 Exhibit 8, p. 28.
- 124 Exhibit 342; Exhibit 474, p. 2 (with minor variations); and Exhibit 421, p. 1.
- 125 Exhibit 342, p. 2.
- 126 Exhibit 474, p. 2.
- 127 Exhibit 421, p. 2.
- 128 Exhibit 473; PPR 5, pp. 64–66; Jeff Grout, Transcript, January 17, p. 18; see also Canada's final written submissions, p. 60, para. 228, available at www.cohencommission.ca.
- 129 Jeff Grout Transcript, January 17, p. 18; see also First Nations Coalition's final written submission, p. 277, para. 750, available at www.cohencommission.ca.
- 130 First Nations Coalition's final written submission, p. 277, para. 750, available at www.cohencommission.ca.
- 131 Canada's final written submissions, p. 202, para. 695, available at www.cohencommission.ca.
- 132 Exhibit 342, p. 3.
- 133 Exhibit 342, p. 2, p. 5, and Appendix B.
- 134 Exhibit 342, p. 1; see also Exhibit 609, p. 4.
- 135 Exhibit 342, p. 1.
- 136 Exhibit 342, p. 4.
- 137 Jeff Grout Transcript, January 17, 2011, pp. 12, 22.
- 138 Exhibit 609, p. 3.
- 139 Exhibit 609, p. 2.
- 140 Brian Assu, Jeffery Young and Peter Sakich, Transcript, February 11, 2011, p. 66; see also Conservation Coalition's final written submissions, pp. 9–10, para. 25, available at www.cohencommission.ca.
- 141 Exhibit 609, p. 8.
- 142 Pat Matthew, Transcript, February 1, 2011, pp. 8, 14.
- 143 Jeffery Young, Transcript, February 11, 2011, pp. 34–35; see also Transcript, June 28, 2011, pp. 49–50; see also British Columbia's final written submissions, p. 25, available at www.cohencommission.ca.
- 144 Barry Rosenberger, Transcript, July 4, 2011, pp. 38–39.
- 145 Transcript, September 23, 2011, p. 86 and September 26, 2011, p. 4; see also Exhibit 756, p. 9; see also Canada's final written submissions, p. 11, para. 46, available at www.cohencommission.ca.
- 146 First Nations Coalition's final written submission, pp. 277–79, paras. 750–54, available at www.cohencommission.ca.
- 147 Transcript, February 11, 2011, p. 34.
- 148 Transcript, February 1, 2011, p. 5.
- 149 Transcript, February 1, 2011, p. 5.

- 150 Jeff Grout, Transcript, February 24, 2011, pp. 39-40; see also Area D Salmon Gillnet Association & Area B Harvest Committee's final written submissions, p. 51, available at www.cohencommission.ca.
- 151 Transcript, February 22, 2011, pp. 45-46; see also Gerry Kristianson and Wayne Saito, Transcript, February 1, 2011, pp. 33-34; Transcript, February 24, 2011, pp. 39-40.
- 152 Dennis Brown, Transcript, February 22, 2011, pp. 44-45; Barry Rosenberger, Transcript, January 17, 2011, p. 78; Pat Matthew, Transcript, February 1, 2011, pp. 14, 15, 28.
- 153 Transcript, February 22, 2011, p. 47.
- 154 Transcript, February 1, 2011, p. 17.
- 155 Transcript, February 1, 2011, pp. 27-28.
- 156 Transcript, February 11, 2011, pp. 43-44; and Transcript, March 16, 2011, p. 26.
- 157 Exhibit 474.
- 158 PPR 6, para. 141.
- 159 Exhibit 474, p. 2, para. 1.1.
- 160 Exhibit 474, p. 7, para. 2.3; see also Transcript, January 17, 2011, p. 13.
- 161 Exhibit 474, p. 3, para. 1.4, and p. 7, para. 2.5.
- 162 Exhibit 474, p. 3, para. 1.4.
- 163 Bill Duncan, Transcript, March 1, 2011, p. 37.
- 164 Transcript, March 1, 2011, pp. 34-35; see also public submission 0263-HAWKSHAW, available at www.cohencommission.ca.
- 165 Exhibit 474, p. 3.
- 166 Exhibit 474 p. 4.
- 167 Exhibit 474, p. 7.
- 168 Exhibit 474, pp. 4-8.
- 169 Exhibit 474, p. 4.
- 170 Transcript, February 23, 2011, pp. 63-64.
- 171 Transcript, February 23, 2011, pp. 63-64; Exhibit 474, p. 10.
- 172 Jeff Grout, Transcript, January 17, 2011, pp. 11-12.
- 173 Jeff Grout, Transcript, January 17, 2011, p. 11.
- 174 Rob Morley, Transcript, March 1, 2011, pp. 33-34; Transcript, February 22, 2011, p. 39; Wayne Saito, Transcript, February 1, 2011, p. 16.
- 175 Transcript, February 22, 2011, pp. 39-42.
- 176 Transcript, March 1, 2011, p. 35.
- 177 Transcript, February 23, 2011, p. 65.
- 178 Gerry Kristianson, Transcript, February 1, 2011, pp. 16-17.
- 179 Transcript, January 17, 2011, p. 15.
- 180 PPR 7, para. 17.
- 181 PPR 7, para. 17; Exhibit 421, pp. 1-2.
- 182 Exhibit 421, p. 3.
- 183 Exhibit 421, p. 2.
- 184 Jeff Grout, Transcript, January 17, 2011, p. 14.
- 185 Transcript, February 1, 2011, p. 18; see also Transcript, March 2, 2011, p. 33.
- 186 Transcript, January 17, 2011, p. 16; see also Jeffery Young, Transcript, February 11, 2011, p. 40: "[A]ll of our current members each have advanced graduate level training in either fisheries, science or ecology."
- 187 Transcript, January 17, 2011, p. 91.
- 188 Transcript, February 11, 2011, p. 32.
- 189 Transcript, February 11, 2011, pp. 72-73.
- 190 Marcel Shepert, Transcript, July 4, 2011, pp. 17-18.
- 191 Exhibit 290, p. 1.
- 192 Exhibit 289; Marcel Shepert, Transcript, July 4, 2011, pp. 17-18.
- 193 Marcel Shepert, Transcript, July 4, 2011, p. 50.
- 194 Exhibit 1220, p. 2; Barry Huber, Transcript, June 30, 2011, p. 6.
- 195 Transcript, June 30, 2011, p. 6.
- 196 Marcel Shepert, Transcript, July 4, 2011, p. 18.
- 197 Exhibit 290, p. 1; see also Exhibit 1220, p. 2.
- 198 Exhibit 1220; Transcript, June 30, 2011, p. 5; Transcript, July 4, 2011, p. 50.
- 199 Canada's final written submissions, p. 207, para. 707, available at www.cohencommission.ca.
- 200 PPR 6, pp. 60-61.
- 201 PPR 6, p. 61.
- 202 Exhibit 475, p. 1.
- 203 Exhibit 475, pp. 1-2.
- 204 Exhibit 475, p. 2.
- 205 Exhibit 475, p. 2.
- 206 Exhibit 473.
- 207 Exhibit 863, p. 4.
- 208 Peter Sakich, Transcript, February 11, 2011, p. 42.
- 209 Exhibit 392, p. 7.
- 210 Gerry Kristianson, Transcript, February 1, 2011, pp. 76-77; see also Pat Matthew, Transcript, February 1, 2011, p. 81.
- 211 Gerry Kristianson, Transcript, February 1, 2011, pp. 79-80; Pat Matthew, Transcript, February 1, 2011, p. 81; Peter Sakich, Transcript, February 11, 2011, p. 51; Paul Ryall, Transcript, March 16, 2011, p. 26.
- 212 Exhibit 392, p. 2.
- 213 Jeffrey Young, Transcript, February 11, 2011, p. 51.
- 214 Peter Sakich, Transcript, February 11, 2011, p. 51.
- 215 British Columbia's final written submissions, p. 25.
- 216 First Nations Coalition's final written submissions, pp. 244-45.
- 217 Transcript, February 1, 2011, p. 28; see also Wayne Saito, Transcript, February 11, 2011, p. 8.
- 218 Transcript, February 1, 2011, pp. 82-83.
- 219 Transcript, January 21, 2011, pp. 11-13.
- 220 Marcel Shepert, Transcript, July 4, 2011, p. 7.
- 221 Ernie Crey, Transcript, July 4, 2011, p. 8.
- 222 Jeff Grout, Transcript, January 21, 2011, p. 13.
- 223 Transcript, February 3, 2011, pp. 83-84.
- 224 Transcript, July 5, 2011, pp. 8-9.
- 225 Transcript, July 4, 2011, p. 15.
- 226 Transcript, December 14, 2010, p. 23.
- 227 Transcript, February 11, 2011, pp. 41-42.
- 228 Transcript, July 4, 2011, p. 63.
- 229 Marcel Shepert, Transcript, July 4, 2011, p. 65.
- 230 See also PPR 6, paras. 60-100.
- 231 Transcript, December 16, 2010, p. 8.
- 232 Jeff Grout, Transcript, February 23, 2011, p. 3.
- 233 Transcript, February 23, 2011, p. 3.
- 234 Exhibit 264; Transcript, February 23, 2011, p. 3.
- 235 Transcript, February 23, 2011, p. 2.
- 236 Public submission 0383-PROBERT, available at www.cohencommission.ca.
- 237 *Fishery (General) Regulations*, SOR/95-53, s. 22(1)(a).
- 238 *Fishery (General) Regulations*, SOR/95-53, s. 6(1).
- 239 Jeff Grout, Transcript, February 23, 2011, pp. 3-4.
- 240 See also PPR 6, pp. 23-28.
- 241 Dennis Brown, Transcript, February 22, 2011, p. 7.
- 242 Exhibit 455.
- 243 Exhibit 455, p. ix.
- 244 Exhibit 456.
- 245 Exhibit 456, p. 30.
- 246 Exhibit 456, and pp. 7, 12-15.
- 247 Exhibit 457.
- 248 Exhibit 457, pp. 5-6.
- 249 Exhibit 457 (recommendations dispersed through document); see also PPR 6, para. 75.
- 250 See PPR 6, pp. 28-30.
- 251 Exhibit 264.
- 252 Exhibit 264, p. 15.
- 253 Transcript, February 23, 2011, p. 23.
- 254 Exhibit 264, pp. 15-36.
- 255 Exhibit 264, p. 38.
- 256 Exhibit 264, p. 20.
- 257 Exhibit 264, p. 25.
- 258 Exhibit 264, p. 26.
- 259 Exhibit 718, p. 50; Karl English, Transcript, April 14, 2011, p. 14.
- 260 Ryan McEachern, Transcript, February 22, 2011, p. 8;

- Chris Ashton, Transcript, February 22, 2011, p. 10.
- 261 Rob Morley, Transcript, March 1, 2011, p. 7; Chris Ashton, Transcript, February 22, 2011, p. 12.
- 262 Transcript, August 19, 2011, p. 56.
- 263 Barry Huber, Transcript, June 30, 2011, p. 37; Kaarina McGivney, Transcript, August 19, 2011, pp. 3–4.
- 264 Kaarina McGivney, Transcript, August 19, 2011, p. 4; Barry Huber, Transcript, June 30, 2011, pp. 79–80.
- 265 Kaarina McGivney, Transcript, August 19, 2011, p. 4.
- 266 Kaarina McGivney, Transcript, August 19, 2011, p. 4; see also Barry Rosenberger, Transcript, July 4, 2011, p. 28.
- 267 Kaarina McGivney, Transcript, September 2, 2011, p. 78.
- 268 Transcript, June 30, 2011, p. 80.
- 269 Transcript, June 30, 2011, p. 81.
- 270 Barry Huber, Transcript, June 30, 2011, p. 94.
- 271 Transcript, June 30, 2011, p. 80.
- 272 Exhibit 1426, p. 2; Kaarina McGivney, Transcript, August 19, 2011, pp. 38–39.
- 273 Transcript, August 19, 2011, p. 39.
- 274 Kaarina McGivney, Transcript, September 2, 2011, pp. 91–92.
- 275 Transcript, August 19, 2011, pp. 37–38.
- 276 Exhibit 1426, p. 2.
- 277 Exhibit 493, p. 75.
- 278 See PPR 18, p. 66.
- 279 See PPR 18, pp. 68–69.
- 280 Exhibit 591, 2010–2011 Salmon Area Report (by fee type).
- 281 Kaarina McGivney, Transcript, August 19, 2011, p. 3.
- 282 Exhibit 1426, p. 2.
- 283 See also PPR 6, pp. 31–34.
- 284 Exhibit 264, p. 32.
- 285 Jeff Grout, Transcript, February 23, 2011, pp. 8–9.
- 286 Exhibit 264, p. 32.
- 287 Exhibit 264, p. 32.
- 288 Transcript, February 23, 2011, pp. 9–10.
- 289 Jeff Grout, Transcript, February 23, 2011, p. 16.
- 290 Exhibit 459, p. 3.
- 291 Jeff Grout, Transcript, February 23, 2011, pp. 11–14, 27–28.
- 292 For an example of the results of this process, see Exhibit 458.
- 293 Jeff Grout, Transcript, Feb. 23, 2011, p. 9; see also Exhibit 317.
- 294 Chris Ashton, Transcript, February 22, 2011, p. 10; Rob Morley, Transcript, March 1, 2011, pp. 9–10; Jeff Grout, Transcript, February 23, 2011, pp. 19–20.
- 295 Transcript, February 22, 2011, p. 9.
- 296 Ryan McEachern, Transcript, February 22, 2011, p. 9; see also Jeff Grout, Transcript, February 24, 2011, p. 11; see also Bill Duncan, Transcript, March 1, 2011, p. 6.
- 297 Chris Ashton, Transcript, February 22, 2011, p. 10; see also Rob Morley, Transcript, March 1, 2011, pp. 9–10.
- 298 Transcript, March 1, 2011, p. 8.
- 299 Transcript, February 22, 2011, p. 8.
- 300 Exhibit 264, pp. 35–36.
- 301 Exhibit 264, p. 36.
- 302 Exhibit 264, p. 36.
- 303 Kathy Scarfo, Transcript, March 1, 2011, p. 13; Jeff Grout, Transcript, February 23, 2011, p. 24.
- 304 Exhibit 264, p. 29.
- 305 Exhibit 266, p. 7.
- 306 Exhibit 264, p. 31.
- 307 Jeff Grout, Transcript, February 23, 2011, pp. 20–21, 23.
- 308 Jeff Grout, Transcript, February 23, 2011, pp. 23–25; see also Gerry Kristianson, Transcript, March 7, 2011, pp. 11–12.
- 309 Jeff Grout, Transcript, February 23, 2011, pp. 20–21, 23.
- 310 Transcript, March 2, 2011, p. 5.
- 311 Transcript, March 2, 2011, p. 4.
- 312 See, for example, Exhibit 445, pp. 115–16.
- 313 Exhibit 445, p. 112.
- 314 Exhibit 264, p. 25.
- 315 Deborah Sneddon and Joe Tadey, Transcript, March 2, 2011, p. 23.
- 316 Transcript, March 2, 2011, pp. 40–41.
- 317 Exhibit 526A, p. 2; Transcript, March 2, 2011, p. 40; see also Transcript, April 14, 2011, p. 15, and Exhibit 718, pp. 49–50.
- 318 Exhibit 526A, pp. 2–3.
- 319 Exhibit 526A, p. 2.
- 320 PPR 7, pp. 10–12.
- 321 Devona Adams, Transcript, March 2, 2011, p. 44.
- 322 Devona Adams, Transcript, March 2, 2011, pp. 44–45.
- 323 Exhibit 527.
- 324 Transcript, March 2, 2011, p. 46.
- 325 Exhibit 527, p. 1.
- 326 Exhibit 527, pp. 7–9 (Principles)
- 327 Exhibit 527, pp. 11–13 (Strategic Goals).
- 328 Transcript, March 2, 2011, pp. 46–47.
- 329 Exhibit 320, p. 1 (also tendered as Exhibit 947, DFO website version); see also PPR 5, p. 60.
- 330 Transcript, January 17, 2011, pp. 20, 21.
- 331 Jeff Grout, Transcript, January 17, 2011, p. 21.
- 332 Exhibit 65, pp. 8 (Article IV, para. 3), 76 (Annex IV, chap. 4, para. 4), 79 (Annex IV, chap. 4, para. 13(a)).
- 333 See also PPR 5, pp. 83–89.
- 334 Exhibit 65, p. 79 (Annex IV, chap. 4, para. 13(a), (b), and (c)); Mike Lapointe, Transcript, January 18, 2011, p. 31.
- 335 Transcript, January 21, 2011, p. 44.
- 336 Exhibit 718, p. 173.
- 337 Transcript, April 14, 2011, p. 29.
- 338 Transcript, January 18, 2011, pp. 5, 7; Sue Grant, Transcript, January 26, 2011, p. 79.
- 339 Mike Lapointe, Transcript, January 19, 2011, p. 28.
- 340 Transcript, January 19, 2011, p. 40; see also Sue Grant, Transcript, January 26, 2011, p. 40.
- 341 Transcript, January 24, p. 67; Sue Grant, Transcript, January 26, 2011, pp. 45–47.
- 342 Jeff Grout, Transcript, January 17, 2011, p. 24.
- 343 Exhibit 340A; Exhibit 341.
- 344 Jeff Grout, Transcript, January 17, 2011, p. 24; see also PPR 5, p. 85.
- 345 Jeff Grout, Transcript, January 17, 2011, p. 29;
- 346 Mike Lapointe, Transcript, January 18, 2011, p. 9.
- 347 Jeff Grout, Transcript, January 17, 2011, p. 25.
- 348 Jeff Grout, Transcript, January 17, 2011, p. 29.
- 349 Transcript, January 17, 2011, p. 29.
- 350 Transcript, January 17, 2011, p. 31.
- 351 Transcript, January 26, 2011, pp. 2–4.
- 352 Transcript, January 26, 2011, pp. 4, 5.
- 353 Barry Rosenberger, Transcript, January 21, 2011, p. 69; Sue Grant, Transcript, January 26, 2011, pp. 15–16.
- 354 PPR 5, p. 85.
- 355 Transcript, January 26, 2011, pp. 5–6.
- 356 Transcript, January 26, 2011, p. 6.
- 357 Transcript, January 26, 2011, p. 7.
- 358 Timber Whitehouse, Transcript, February 2, 2011, p. 14; Brian Riddell, Transcript, February 2, 2011, p. 14.
- 359 Sue Grant, Transcript, January 26, 2011, p. 8.
- 360 Transcript, January 26, 2011, p. 8.
- 361 Transcript, January 26, 2011, p. 9.
- 362 Transcript, January 26, 2011, pp. 9–10.
- 363 Exhibit 351.
- 364 Exhibit 351, pp. 2–3.
- 365 Transcript, January 26, 2011, p. 12.
- 366 Transcript, January 26, 2011, p. 13.
- 367 Transcript, January 26, 2011, p. 14; see also Exhibit 352, Table 2, p. 43.
- 368 Jeff Grout, Transcript, January 24, 2011, p. 65.
- 369 Sue Grant, Transcript, January 26, 2011, p. 19; Barry Rosenberger, Transcript, January 21, 2011, p. 45.
- 370 Sue Grant, Transcript, January 26, 2011, p. 19.
- 371 Transcript, January 19, 2011, p. 40.

- 372 Transcript, January 21, 2011, p. 46.
 373 Exhibit 352, p. 3.
 374 Transcript, January 26, 2011, p. 28.
 375 Exhibit 314, p. 3; PPR 5, p. 86.
 376 Exhibit 314, p. 5.
 377 Exhibit 314, p. 3; PPR 5, p. 86.
 378 Exhibit 314, p. 4; PPR 5, p. 86.
 379 PPR 5, p. 88; Exhibit 314, p. 5; Mike Lapointe, Transcript, January 18, 2011, p. 14.
 380 Exhibit 314, p. 5.
 381 Exhibit 314, p. 7.
 382 Exhibit 314, pp. 5–6.
 383 PPR 5, pp. 88–89.
 384 Exhibit 314, p. 6.
 385 Exhibit 65, pp. 8, 76.
 386 See also PPR 5, pp. 28–49; Exhibit 400, pp. 12–13.
 387 Transcript, November 3, 2010, p. 103.
 388 Transcript, February 7, 2011, p. 21.
 389 See also PPR 5, pp. 47–48.
 390 Transcript, February 9, 2011, p. 12.
 391 PPR 5, p. 47; Jim Woodey, Transcript, February 9, 2011, pp. 9–10.
 392 Jim Woodey, Transcript, February 9, 2011, pp. 12–13; Carl Walters, Transcript, February 9, 2011, p. 15; Brian Riddell, Transcript, February 9, 2011, p. 14.
 393 Exhibit 398, p. 5.
 394 See PPR 5, p. 36, Figure 1.
 395 Jim Woodey, Transcript, February 9, 2011, p. 5.
 396 Exhibit 400, p. 11.
 397 Exhibit 398, p. 28; see also PPR 5, p. 40.
 398 Exhibit 399, p. 11; Exhibit 400, pp. 11–13.
 399 Exhibit 400, p. 13.
 400 Transcript, February 7, 2011, p. 42.
 401 Jim Woodey, Transcript, February 9, 2011, pp. 3–4; see also Exhibit 416.
 402 Jim Woodey, Transcript, February 9, 2011, pp. 7, 8.
 403 Rob Morley, Transcript, February 8, 2011, pp. 78–79.
 404 Exhibit 395, pp. 1–3.
 405 Al Cass, Transcript, February 7, 2011, p. 4; PPR 5, pp. 31–32.
 406 Al Cass, Transcript, February 7, 2011, pp. 4–5.
 407 Exhibit 396, p. 3; see also Exhibit 400, pp. 3–4; see also David Marmorek, Transcript, September 20, 2011, p. 15.
 408 Exhibit 497.
 409 Dennis Brown, Transcript, February 22, 2011, p. 16.
 410 Exhibit 400, p. 1.
 411 Exhibit 396, p. 1; Al Cass, Transcript, February 7, 2011, pp. 8–9.
 412 Exhibit 396, p. 4.
 413 Exhibit 396, p. 4.
 414 Transcript, February 7, 2011, p. 8.
 415 Exhibit 397.
 416 Transcript, February 7, 2011, p. 12.
 417 Exhibit 322, p. 9.
 418 Transcript, January 17, 2011, pp. 43–44.
 419 Transcript, February 7, 2011, pp. 15–17.
 420 Transcript, February 7, 2011, pp. 15–16 (see also p. 25).
 421 PPR 5, p. 35.
 422 Exhibit 398.
 423 Exhibit 398, p. 25; Al Cass, Transcript, February 7, 2011, pp. 20–21.
 424 PPR 5, p. 37.
 425 Exhibit 322, p. 2; Jeff Grout, Transcript, January 17, 2011, pp. 45–46.
 426 Jeff Grout, Transcript, January 17, 2011, p. 46; Exhibit 322.
 427 Jeff Grout, Transcript, January 17, 2011, p. 42.
 428 Exhibit 322; Jeff Grout, Transcript, January 17, 2011, p. 43.
 429 See also PPR 5, p. 37.
 430 Transcript, January 17, 2011, pp. 44–45.
 431 Transcript, February 7, 2011, p. 24; Mike Staley, Transcript, February 8, 2011, p. 90.
 432 Jeff Grout, Transcript, January 17, 2011, pp. 51, 52; see also Mike Lapointe, Transcript, January 18, 2011, pp. 6–8; see also Exhibit 322, p. 18.
 433 Transcript, January 17, 2011, p. 51.
 434 Transcript, February 8, 2011, p. 121; see also PPR 5, pp. 43–45.
 435 Exhibit 399.
 436 Exhibit 399, p. 1.
 437 Exhibit 399, p. 25.
 438 Exhibit 399, p. 4; Al Cass, Transcript, February 7, 2011, pp. 25–26 (as explained by Al Cass, the FRSSI interim benchmark is the “no fishing point”).
 439 Exhibit 399, pp. 26–27.
 440 Transcript, March 16, 2011, p. 5.
 441 Al Cass, Transcript, February 7, 2011, p. 29; Paul Ryall, Transcript, March 16, 2011, p. 13.
 442 Al Cass, Transcript, February 7, 2011, p. 81; Rob Morley, Transcript, February 7, 2011, p. 78; Ken Wilson, Transcript, February 7, 2011, p. 77; Exhibit 400, p. 25.
 443 Rob Morley, Transcript, February 7, 2011, p. 45; Ken Wilson, Transcript, February 7, 2011, p. 44.
 444 Al Cass, Transcript, February 7, 2011, p. 50; Rob Morley, Transcript, February 7, 2011, pp. 52, 55; Ken Wilson, Transcript, February 7, 2011, pp. 51–52.
 445 See Paul Ryall, Transcript, March 16, 2011, p. 6 (acknowledging more work could be done in that area).
 446 Transcript, February 7, 2011, p. 70.
 447 Transcript, June 3, 2011, p. 5.
 448 Paul Ryall, Transcript, March 16, 2011, p. 73; Rob Morley, Transcript, February 7, p. 83.
 449 Carl Walters, Transcript, February 9, 2011, p. 25; Jim Woodey, Transcript, February 9, 2011, p. 16.
 450 Transcript, February 9, 2011, pp. 22–23.
 451 Brian Riddell, Transcript, February 9, 2011, pp. 24–25.
 452 Transcript, February 9, 2011, pp. 30–31, February 10, p. 21.
 453 Brian Riddell, Transcript, February 9, 2011, pp. 51–52; see also Carl Walters, Transcript, February 9, 2011, pp. 52, 54, February 10, p. 15; Ken Wilson, Transcript, February 9, 2011, p. 53, February 10, pp. 18–19.
 454 Ken Wilson, Transcript, February 7, 2011, p. 51, February 9, 2011, pp. 20–21.
 455 Carl Walters, Transcript, February 10, 2011, pp. 28–29; Ken Wilson, Transcript, February 10, 2011, p. 30.
 456 See also PPR 5, pp. 56–64.
 457 Exhibit 317; Exhibit 445; Exhibit 946.
 458 PPR 5, p. 57.
 459 Exhibit 274, p. 4; Exhibit 274A, p. 4; see also PPR 5, p. 58.
 460 Exhibit 317, p. 10; Exhibit 445, p. 12; Exhibit 946, pp. 12, 15.
 461 Exhibit 445, p. 14; Jeff Grout, Transcript, January 17, 2011, pp. 14, 23–24, 50, 58; see also Barry Rosenberger, Transcript, January 17, 2011, p. 64.
 462 See, for example, David Bevan, Transcript, September 26, 2011, pp. 6–7; Susan Farlinger, Transcript, September 26, 2011, p. 8; Pat Chamut, Transcript, November 30, 2010, p. 105.
 463 Exhibit 597.
 464 Jeff Grout, Transcript, January 17, 2011, pp. 72–73, 80.
 465 See Exhibits 1252–56; Marcel Shepert, Transcript, July 4, 2011, pp. 58–59; see also Pat Matthew, Transcript, February 1, 2011, p. 8.
 466 See Exhibit 1256; also Ross Wilson, Transcript, July 4, 2011, p. 104.
 467 Transcript, July 4, 2011, p. 53; see also Ernie Crey, Transcript, July 4, 2011, p. 54.
 468 Transcript, July 4, 2011, pp. 54, 60; see also Susan Farlinger, Transcript, September 28, 2011, p. 82.
 469 First Nations Coalition’s final written submissions, p. 278, available at www.cohencommission.ca.
 470 Transcript, February 11, 2011, p. 66.
 471 Transcript, January 17, 2011, p. 72.

- 472 Exhibit 445, pp. 2–3.
- 473 Jeff Grout, Transcript, January 17, 2011, p. 73; see also David Bevan, Transcript, November 3, 2010, pp. 101–2.
- 474 Jeff Grout, Transcript, January 17, 2011, pp. 82, 83; Barry Rosenberger, Transcript, January 17, 2011, p. 83.
- 475 Transcript, January 17, 2011, p. 81.
- 476 Exhibit 326; Exhibit 327.
- 477 Exhibit 327, p. 5.
- 478 Transcript, January 17, 2011, p. 85.
- 479 PPR 5 p. 62; see also Exhibit 273A.
- 480 Exhibit 273A.
- 481 Susan Farlinger, Transcript, December 16, 2010, p. 13.
- 482 Exhibit 403.
- 483 Exhibit 403, p. 1; see also Paul Ryall, Transcript, June 2, 2011, p. 72; Susan Farlinger, Transcript, March 4, 2011, p. 6, December 16, 2010, p. 91, September 27, 2011, p. 33.
- 484 Exhibit 403, p. 2.
- 485 Exhibit 403, p. 5.
- 486 Susan Farlinger, Transcript, March 4, 2011, p. 7.
- 487 PPR 5, pp. 63–64; Exhibit 274A, p. 4.
- 488 Transcript, December 16, 2010, p. 14.
- 489 Exhibit 65, pp. 8 (Article VI, para. 6), 77 (Annex IV, chap. 4, para. 5), 79 (Annex IV, chap. 4, para. 12).
- 490 Barry Rosenberger, Transcript, January 17, 2011, p. 92.
- 491 Transcript, November 8, 2010, p. 27.
- 492 Transcript, November 8, 2010, p. 16.
- 493 Exhibit 330, p. 3.
- 494 Barry Rosenberger, Transcript, January 21, 2011, p. 7.
- 495 Transcript, January 18, 2011, p. 23.
- 496 Exhibit 330, p. 19.
- 497 Exhibit 330, p. 20.
- 498 Mike Lapointe, Transcript, January 18, 2011, p. 33.
- 499 Exhibit 330, p. 19.
- 500 Exhibit 330, p. 20; Mike Lapointe, Transcript, January 18, 2011, p. 37.
- 501 See Exhibit 331, p. 12.
- 502 PPR 5, p. 26.
- 503 Exhibit 65, pp. 75–76, Annex IV, chap. 4, para. 3; see also Mike Lapointe, Transcript, November 8, 2010, pp. 14–15.
- 504 PPR 5, p. 26.
- 505 Exhibit 65, pp. 75–76, Annex IV, chap. 4, paras. 2 and 3.
- 506 Exhibit 65, p. 75 (Annex IV, chap. 4, para. 2).
- 507 Exhibit 65, p. 76 (Annex IV, chap. 4, para. 3(d)).
- 508 Exhibit 65, p. 76 (Annex IV, chap. 4, para. 3(d)).
- 509 PPR 5, p. 49; Mike Lapointe, Transcript, January 18, 2011, pp. 82–83; see also Exhibit 333, p. 2.
- 510 Mike Lapointe, Transcript, January 18, 2011, p. 82; David Patterson, Transcript, January 27, 2011, p. 96.
- 511 David Patterson, Transcript, January 27, 2011, pp. 96, 97.
- 512 David Patterson, Transcript, January 27, 2011, p. 108.
- 513 David Patterson, Transcript, January 27, 2011, p. 92.
- 514 Transcript, January 27, 2011, p. 93.
- 515 David Patterson, Transcript, January 27, 2011, p. 93.
- 516 David Patterson, Transcript, January 27, 2011, pp. 94–95.
- 517 David Patterson, Transcript, January 27, 2011, p. 97.
- 518 David Patterson, Transcript, February 8, 2011, p. 13.
- 519 David Patterson, Transcript, February 8, 2011, p. 14.
- 520 Transcript, February 8, 2011, p. 14.
- 521 David Patterson, Transcript, January 27, 2011, p. 100.
- 522 Mike Lapointe, Transcript, January 18, 2011, pp. 30–31.
- 523 David Patterson, Transcript, January 27, 2011, p. 99.
- 524 David Patterson, Transcript, January 27, 2011, p. 104; see also Mike Lapointe, Transcript, January 18, 2011, p. 31.
- 525 Transcript, February 8, 2011, pp. 11–12.
- 526 Transcript, January 27, 2011, p. 105; Transcript, February 8, 2011, p. 10.
- 527 Transcript, January 27, 2011, p. 105; Transcript, February 8, 2011, p. 9; see also Exhibit 405.
- 528 Exhibit 405, p. 21.
- 529 David Patterson, Transcript, January 27, 2011, pp. 93–94.
- 530 See also PPR 5, paras. 258–71, pp. 96–100.
- 531 Exhibit 65, p. 79 (Annex IV, chap. 4, para. 12).
- 532 Exhibit 68; Exhibit 69.
- 533 Mike Lapointe, Transcript, November 8, 2010, p. 28.
- 534 Transcript, January 19, 2011, p. 24.
- 535 Barry Rosenberger, Transcript, January 17, 2011, p. 69.
- 536 Mike Lapointe, Transcript, January 18, 2011, pp. 38–39.
- 537 Exhibit 65, pp. 77 (Annex IV, chap. 4, para. 5), 79 (Annex IV, chap. 4, para. 12); Barry Rosenberger, Transcript, January 17, 2011, p. 90; Mike Lapointe, Transcript, January 18, 2011, p. 71.
- 538 See PPR 5, p. 26.
- 539 Mike Lapointe, Transcript, January 18, 2011, pp. 43–44.
- 540 Mike Lapointe, Transcript, November 8, 2010, p. 33; see also Exhibit 65, p. 77 (Annex IV, chap. 4, para. 6).
- 541 Mike Lapointe, Transcript, November 8, 2010, pp. 33–34.
- 542 Mike Lapointe, Transcript, November 8, 2010, pp. 34–35.
- 543 PPR 5, p. 26.
- 544 Transcript, November 8, 2010, p. 31.
- 545 Exhibit 65, p. 79 (Annex IV, chap. 4, para. 13).
- 546 Transcript, January 21, 2011, pp. 41–42.
- 547 Transcript, January 19, 2011, p. 50.
- 548 Transcript, January 21, 2011, pp. 5–6.
- 549 Transcript, February 11, 2011, p. 48.
- 550 Rob Morley, Transcript, February 8, 2011, p. 66.
- 551 Gerry Kristianson, Transcript, February 1, 2011, p. 35; Pat Matthew, Transcript, February 1, 2011, p. 38.
- 552 Transcript, January 17, 2011, pp. 87–90.
- 553 Barry Rosenberger, Transcript, January 25, 2011, p. 27; Transcript, July 4, 2011, p. 11.
- 554 Transcript, March 4, 2011, p. 61.
- 555 Transcript, June 30, 2011, pp. 63–64.
- 556 Transcript, July 4, 2011, pp. 77–78.
- 557 Transcript, July 4, 2011, p. 78.
- 558 Barry Rosenberger, Transcript, January 25, 2011, p. 28.
- 559 Exhibit 65, p. 7 (Article II, para. 21).
- 560 Exhibit 65, p. 9, (Article VI, para. 6), p. 77 (Annex IV, chap. 4, para. 5), 79 (Annex IV, chap. 4, para. 12); see also Barry Rosenberger, Transcript, January 17, 2011, p. 90; PPR 5, pp. 99–101.
- 561 Barry Rosenberger, Transcript, January 17, 2011, p. 90.
- 562 Barry Rosenberger, Transcript, January 17, 2011, p. 91.
- 563 Transcript, January 17, 2011, pp. 89–90.
- 564 Exhibit 65, p. 79 (Annex IV, chap. 4, para. 13); Transcript, January 18, 2011, p. 73.
- 565 Barry Rosenberger, Transcript, January 17, 2011, p. 60; Transcript, January 21, 2011, pp. 12–13; Jeff Grout, Transcript, January 21, 2011, p. 13.
- 566 Exhibit 283.
- 567 Exhibit 283, pp. 83–84 (chap. 9, ss. 5, 59–64). In the TFN Treaty, the communal licences are called “Tsawwassen Harvest Documents.”
- 568 Exhibit 283, pp. 84–87 (chap. 9, ss. 65–73).
- 569 Exhibit 283, p. 84 (chap. 9, s. 62).
- 570 Exhibit 283, p. 84 (chap. 9, s. 62).
- 571 Exhibit 283, p. 92 (chap. 9, ss. 102–5).
- 572 See also PPR 5, pp. 90–96.
- 573 Exhibit 315.
- 574 Transcript, January 20, 2011, p. 32.
- 575 Exhibit 315, exhibit B, p. 4.
- 576 Exhibit 315, exhibit B, p. 3.
- 577 Exhibit 315, exhibit B, pp. 1–2.
- 578 Exhibit 315, exhibit B, p. 3.
- 579 Mike Lapointe, Transcript, January 20, 2011, p. 32.
- 580 Exhibit 315, exhibit B, p. 3.
- 581 Exhibit 315, exhibit B, p. 3.

- 582 Transcript, January 20, 2011, p. 34.
 583 See also PPR 5, pp. 68–71.
 584 Exhibit 366, p. 1; see also Mike Lapointe, Transcript, November 8, 2010, pp. 29–30.
 585 Jim Cave, Transcript, January 31, 2011, p. 12.
 586 Brian Assu, Transcript, January 31, 2011, p. 22.
 587 Paul Ryall, Transcript, January 31, 2011, pp. 16–17.
 588 Mike Lapointe, Transcript, January 18, 2011, p. 3; Exhibit 329; Paul Ryall, Transcript, January 31, 2011, p. 24.
 589 Exhibit 371.
 590 Paul Ryall, Transcript, January 31, 2011, p. 27; Jim Cave, Transcript, January 31, 2011, pp. 10–11, 23.
 591 Paul Ryall, Transcript, January 31, 2011, pp. 39–40, 83.
 592 Transcript, September 23, 2011, p. 5.
 593 Transcript, September 23, 2011, p. 6.
 594 Jim Cave, Transcript, January 31, 2011, pp. 28–29.
 595 Brian Assu, Transcript, January 31, 2011, p. 29.
 596 Jim Cave, Transcript, January 31, 2011, p. 11.
 597 Jim Cave, Transcript, January 31, 2011, pp. 25, 97.
 598 Exhibit 372; Exhibit 373; Jim Cave, Transcript, January 31, 2011, pp. 58–59.
 599 Exhibit 373, p. 3; Jim Cave, Transcript, January 31, 2011, p. 58.
 600 Jim Cave, Transcript, January 31, pp. 53–54; Brian Assu, Transcript, January 31, 2011, p. 54.
 601 Transcript, September 23, 2011, p. 7.
 602 Transcript, January 31, 2011, pp. 14–16, 18–19.
 603 Transcript, January 31, 2011, pp. 6–7, 9.
 604 Jim Cave, Transcript, January 31, 2011, p. 9.
 605 Jim Cave, Transcript, January 31, 2011, p. 8.
 606 Exhibit 315, exhibit B, p. 2.
 607 Jim Cave, Transcript, January 31, 2011, pp. 19, 20.
 608 Jim Cave, Transcript, January 31, 2011, pp. 61, 64; Paul Ryall, Transcript, January 31, 2011, p. 82.
 609 Jim Cave, Transcript, January 31, 2011, p. 64; Paul Ryall, Transcript, January 31, 2011, p. 82.
 610 Transcript, January 31, 2011, pp. 64–66.
 611 Transcript, January 31, 2011, pp. 67–68, 75.
 612 Transcript, January 31, 2011, pp. 86, 87.
 613 Transcript, December 13, 2010, p. 51.
 614 Mike Lapointe, Transcript, January 27, 2011, p. 10; Exhibit 65, Pacific Salmon Treaty, pp. 122–25 (Memorandum of Understanding, 1985); see also PPR 5, pp. 72–74.
 615 Transcript, January 26, 2011, p. 86.
 616 Exhibit 315, exhibit B, p. 2.
 617 Transcript, January 26, 2011, pp. 87–88.
 618 Transcript, January 26, 2011, pp. 95, 99.
 619 Mike Lapointe, Transcript, January 27, 2011, p. 70.
 620 Mike Lapointe, Transcript, January 26, 2011, p. 88.
 621 Transcript, January 26, 2011, pp. 90, 91.
 622 Mike Lapointe, Transcript, January 27, 2011, p. 23; Exhibit 356, p. 2.
 623 Brian Riddell, Transcript, January 27, 2011, pp. 12, 18–19. The operation of the Qualark counter was discontinued in 1998 by DFO because of budget constraints: see PPR 5, pp. 73–74. See also Brian Riddell, Transcript, January 27, 2011, p. 12 (not picked up by DFO management or integrated into PSC work). PPR 5, p. 73.
 624 Transcript, January 27, 2011, pp. 19–20.
 625 Transcript, January 27, 2011, p. 23.
 626 Mike Lapointe, Transcript, January 26, 2011, p. 83.
 627 Mike Lapointe, Transcript, January 27, 2011, p. 30.
 628 Transcript, January 27, 2011, pp. 23, 30; Exhibit 356, p. 2.
 629 Brian Riddell, Transcript, January 27, 2011, p. 22; Mike Lapointe, Transcript, January 27, 2011, pp. 26–27; Exhibit 356, p. 3.
 630 Exhibit 356, p. 3.
 631 Transcript, January 27, 2011, p. 32.
 632 Transcript, September 23, 2011, p. 9.
 633 Exhibit 266, p. 16. see also Gordon Curry, Transcript, February 21, 2011, p. 6; Jeff Grout, Transcript, February 24, 2011, pp. 14–15; PPR 6, pp. 38–49.
 634 Exhibit 266, p. 16. see also Gordon Curry, Transcript, February 21, 2011, p. 6; Jeff Grout, Transcript, February 24, 2011, pp. 14–15; PPR 6, pp. 38–49.
 635 Brent Hargreaves, Transcript, February 21, 2011, p. 14.
 636 Transcript, February 21, 2011, pp. 7, 12.
 637 Brent Hargreaves, Transcript, February 21, 2011, p. 7; see also Rob Morley, Transcript, March 1, 2011, p. 27.
 638 Transcript, February 21, 2011, pp. 64–65.
 639 Brent Hargreaves and Gordon Curry, Transcript, February 21, 2011, pp. 8–9, 57.
 640 Transcript, February 21, 2011, p. 65.
 641 Transcript, February 21, 2011, p. 42.
 642 Transcript, February 21, 2011, p. 40; see also Rob Morley, Transcript, March 1, 2011, p. 27.
 643 Transcript, September 23, 2011, p. 10.
 644 Exhibit 442; Brent Hargreaves, Transcript, February 21, 2011, p. 44; see also PPR 2, pp. 41–43.
 645 Transcript, February 21, 2011, p. 44.
 646 Exhibit 266, Annex 3; Exhibit 443; Gordon Curry, Transcript, February 21, 2011, p. 46.
 647 Gordon Curry, Transcript, February 21, 2011, p. 46.
 648 Exhibit 443, p. 2; Gordon Curry, Transcript, February 21, 2011, p. 46.
 649 Gordon Curry, Transcript, February 21, 2011, p. 46.
 650 Exhibit 443, p. 3.
 651 Transcript, February 21, 2011, pp. 12–13.
 652 Exhibit 432, p. 1.
 653 Exhibit 432, p. 3.
 654 Transcript, February 21, 2011, pp. 16–17; Exhibit 432, p. 3.
 655 Exhibit 432, p. 5.
 656 Exhibit 432, pp. 8–11.
 657 Exhibit 441, pp. i–ii.
 658 Transcript, February 21, 2011, pp. 33–34.
 659 Transcript, February 21, 2011, pp. 38, 39, 43–44; see also Jeff Grout, Transcript, February 24, 2011, pp. 16–17.
 660 Gordon Curry, Transcript, February 21, 2011, p. 34; Brent Hargreaves, Transcript, February 21, 2011, p. 34.
 661 Transcript, February 21, 2011, pp. 34–35.
 662 Gordon Curry, Transcript, February 21, 2011, pp. 35–36.
 663 Transcript, February 21, 2011, p. 36.
 664 Transcript, September 23, 2011, p. 11.
 665 Exhibit 266.
 666 Exhibit 266, p. 7; Gordon Curry, Transcript, February 21, 2011, p. 6.
 667 Exhibit 266, p. 16.
 668 Exhibit 266, p. 7.
 669 See also Gordon Curry, Transcript, February 21, pp. 8–10.
 670 Exhibit 266, pp. 8–10.
 671 Exhibit 266, p. 6.
 672 Transcript, February 21, 2011, p. 35; Gordon Curry, Transcript, February 21, 2011, pp. 38–39, 48.
 673 Transcript, February 21, 2011, pp. 31–32.
 674 Transcript, February 22, 2011, pp. 31, 87, 89.
 675 Transcript, March 1, 2011, p. 29.
 676 Transcript, February 22, 2011, pp. 32–33.
 677 Transcript, March 1, 2011, pp. 27–28.
 678 Transcript, March 20, 2011, p. 20.
 679 Transcript, March 2, 2011, p. 49.
 680 Transcript, March 7, 2011, p. 30.
 681 Transcript, March 3, 2011, p. 18.
 682 PPR 6, pp. 47–48; see also Jeff Grout, Transcript, February 23, 2011, p. 59.
 683 Bill Duncan, Transcript, March 1, 2011, p. 26; Chris Ashton, Transcript, February 22, 2011, p. 34.
 684 Transcript, December 16, 2010, pp. 9–10.
 685 Transcript, February 21, 2011, p. 36.
 686 Gordon Curry, Transcript, February 21, 2011, pp. 35, 38; see also Jeff Grout, Transcript, February 23, 2011, pp. 57–58.

- 687 Transcript, March 2, 2011, pp. 50–52.
- 688 Brent Hargreaves, Transcript, February 21, 2011, pp. 21, 36; see also Exhibit 718, pp. 56–62; Karl English, Transcript, April 14, 2011, p. 21; Karl English, Transcript, April 15, 2011, p. 98.
- 689 Transcript, February 21, 2011, p. 36.
- 690 See also PPR 12; PPR 7, pp. 26–30; Exhibit 718, pp. 15–56.
- 691 Exhibit 268, p. 1; see also PPR 12, pp. 9–11.
- 692 Mike Lapointe, Transcript, January 18, 2011, pp. 40–41.
- 693 PPR 12, p. 10.
- 694 Transcript, May 11, 2011, p. 25; see also Peter Sakich, Transcript, May 12, 2011, p. 71; Colin Masson, Transcript, May 12, 2011, p. 71; PPR 12, p. 11.
- 695 Public submission 0307-WOOD, available at www.cohencommission.ca.
- 696 Public submission 0162-PEDERSEN, available at www.cohencommission.ca.
- 697 See, for example, PPR 12, p. 34.
- 698 Les Jantz, Transcript, May 11, 2011, p. 24; Peter Sakich, Transcript, May 12, 2011, pp. 3, 4; Ken Malloway, Transcript, May 12, 2011, p. 4; Colin Masson, Transcript, May 12, 2011, p. 4; Deborah Sneddon, Transcript, March 2, 2011, p. 73.
- 699 Exhibit 855, Foreword (no discernible page number).
- 700 Exhibit 429; see also PPR 12, pp. 52–56.
- 701 Exhibit 429, p. 3.
- 702 Peter Sakich, Transcript, May 12, 2011, p. 37; Ken Malloway, Transcript, May 12, 2011, p. 37.
- 703 Claire Dansereau, Transcript, September 22, 2011, p. 17; David Bevan, Transcript, September 22, 2011, p. 18.
- 704 Transcript, April 14, 2011, p. 6; Exhibit 718, p. 17.
- 705 Matthew Parslow, Transcript, May 11, 2011, p. 21; Les Jantz, Transcript, May 11, 2011, p. 28.
- 706 PPR 12, pp. 89–96; see also Joe Tadey, Transcript, March 2, 2011, pp. 67–68; March 3, 2011, pp. 11–12.
- 707 PPR 12, pp. 16–18.
- 708 See, for example, Frank Kwak, Transcript, March 7, 2011, pp. 19, 20–21; Gerry Kristianson, Transcript, March 7, p. 21; Joe Tadey, Transcript, March 2, 2011, p. 63; Deborah Sneddon, Transcript, March 2, 2011, p. 63; Robert Houtman, May 11, 2011, p. 9.
- 709 Exhibit 429, p. 5.
- 710 Exhibit 718, pp. 17, 21 (Table 2); Karl English, Transcript, April 14, 2011, pp. 6, 7.
- 711 Transcript, May 11, 2011, pp. 5–10; see also Exhibit 718, pp. 43–47.
- 712 Robert Houtman, Transcript, May 11, 2011, pp. 5–6.
- 713 Robert Houtman, Transcript, May 11, 2011, p. 6.
- 714 Robert Houtman, Transcript, May 11, 2011, pp. 8, 89; PPR 12, pp. 57–60, 61.
- 715 Robert Houtman, Transcript, May 11, 2011, p. 8; see also Exhibit 718, p. 43; Mike Lapointe, Transcript, January 18, 2011, p. 40.
- 716 Robert Houtman, Transcript, May 11, 2011, pp. 8–9; see also Karl English, Transcript, April 15, 2011, p. 64.
- 717 Exhibit 718, pp. 44–46.
- 718 Transcript, April 14, 2011, p. 13.
- 719 PPR 12, pp. 60–61; see also Jeff Grout, Transcript, February 23, 2011, p. 68.
- 720 PPR 12, pp. 27–28.
- 721 David Bevan, Transcript, September 22, 2011, pp. 6–7; Claire Dansereau, Transcript, September 22, 2011, p. 8.
- 722 Robert Houtman, May 11, 2011, p. 6.
- 723 PPR 12, p. 63; see also Robert Houtman, May 11, 2011, p. 6.
- 724 Robert Houtman, Transcript, May 11, 2011, pp. 6–7; PPR 12, p. 63.
- 725 Transcript, May 11, 2011, p. 13.
- 726 Transcript, May 11, 2011, p. 9.
- 727 Transcripts, May 11, 2011, p. 13, 51.
- 728 Transcript, May 11, 2011, p. 12.
- 729 Colin Masson, Transcript, May 12, 2011, p. 19.
- 730 Colin Masson, Transcript, May 12, 2011, p. 19; see also PPR 12, pp. 63–64; see also David Bevan, Transcript, September 22, 2011, pp. 18, 19–20, 65.
- 731 Ryan McEachern, February 22, 2011, p. 27; see also Jeff Grout, Transcript, February 23, 2011, pp. 43, 44, 89.
- 732 Transcript, September 22, 2011, p. 19.
- 733 Peter Sakich, Transcript, May 12, p. 20; see also PPR 12, p. 63.
- 734 Kathy Scarfo, March 1, 2011, pp. 51, 56.
- 735 Devona Adams, March 2, 2011, p. 5; Joe Tadey, Transcript, March 2, 2011, p. 74.
- 736 Joe Tadey, Transcript, March 2, 2011, p. 57.
- 737 Joe Tadey, Transcript, March 2, 2011, p. 58; Exhibit 532, p. 2.
- 738 Devona Adams, Transcript, March 2, 2011, p. 5; see also Exhibit 526A, pp. 2–3.
- 739 Exhibit 718, p. 49.
- 740 PPR 7, p. 28; Devona Adams, Transcript, March 2, 2011, p. 76.
- 741 PPR 7, p. 29.
- 742 Transcript, March 2, 2011, pp. 58–59; March 3, pp. 1–2.
- 743 Joe Tadey, Transcript, March 2, 2011, p. 56.
- 744 Joe Tadey, Transcript, March 2, 2011, pp. 61–62; Exhibit 532, p. 7.
- 745 Transcript, March 2, 2011, p. 57; March 3, 2011, p. 13; PPR 7, p. 27.
- 746 Joe Tadey, Transcript, March 2, 2011, p. 57; see also PPR 7, p. 27.
- 747 Joe Tadey, Transcript, March 2, 2011, p. 57.
- 748 Transcript, March 2, 2011, pp. 64–65; Exhibit 532, pp. 10–11.
- 749 Joe Tadey, Transcript, March 2, 2011, p. 66.
- 750 Exhibit 534, p. 1; see also Joe Tadey, Transcript, March 2, 2011, p. 60; Exhibit 532, pp. 8–13.
- 751 Frank Kwak, Transcript, March 7, 2011, pp. 19, 20, 21; see also Gerry Kristianson, Transcript, March 7, p. 21.
- 752 Transcript, March 2, 2011, pp. 62–63.
- 753 Deborah Sneddon, Transcript, March 2, 2011, p. 63.
- 754 Exhibit 718, pp. 56–57.
- 755 Deborah Sneddon, Transcript, March 2, 2011, p. 73; Joe Tadey, Transcript, March 2, 2011, p. 78.
- 756 Frank Kwak, Transcript, March 7, 2011, pp. 19–20; see also Jeremy Maynard, Transcript, March 7, 2011, p. 29.
- 757 Exhibit 718, p. 49.
- 758 Transcript, March 2, 2011, p. 75; March 3, 2011, p. 14.
- 759 Transcript, March 3, 2011, p. 15.
- 760 PPR 12, p. 150; note that in Technical Report 7 (Exhibit 718), the authors discuss First Nations' fisheries in the marine environment as “below Sawmill” and “above Sawmill.”
- 761 PPR 12, pp. 72–73.
- 762 PPR 12, p. 76.
- 763 Exhibit 429, p. 2; see also Exhibit 860, p. 2.
- 764 Exhibit 860.
- 765 Exhibit 860, p. 14.
- 766 PPR 12, pp. 68–69.
- 767 PPR 12, pp. 69–70.
- 768 Exhibit 718, p. 30.
- 769 PPR 12, pp. 70–72.
- 770 Transcript, December 13, 2010, pp. 50, 51; see also Exhibit 278, Councillor June Quipp of the Cheam Indian Band confirmed that the Stó:lō Tribal Council has an agreement with DFO regarding the monitoring of its FSC fishery. The Cheam Band received approximately \$60,000 per year from DFO to operate a monitoring program, and the Cheam have their own catch monitors who record numbers of fish as they come in.
- 771 Transcript, May 11, 2011, p. 16.
- 772 Transcripts, May 11, 2011, p. 52.
- 773 Transcript, May 11, 2011, pp. 16–17.
- 774 Exhibit 718, p. 31.
- 775 Exhibit 718, p. 32.
- 776 PPR 12, pp. 74–75.

- 777 Transcripts, May 11, 2011, pp. 15–16.
 778 Transcript, May 11, 2011, p. 16.
 779 Les Jantz and Matthew Parslow, Transcript, p. 14.
 780 Matthew Parslow, Transcript, May 11, 2011, p. 16; Les Jantz, Transcript, May 11, 2011, p. 15.
 781 Transcript, May 11, 2011, p. 20.
 782 PPR 12, p. 76.
 783 PPR 12, pp. 76–78.
 784 Exhibit 718, p. 30.
 785 PPR 12, p. 79; Exhibit 718, p. 36; Colin Masson, Transcript, May 12, 2011, p. 21.
 786 PPR 18, pp. 85–86; Exhibits 1422 and 1425.
 787 Matthew Parslow, Transcript, May 11, 2011, p. 89.
 788 Colin Masson, Transcript, May 12, 2011, p. 21; Julie Stewart, Transcript, August 19, 2011, p. 18.
 789 PPR 12, pp. 81–83; see also Exhibit 718, p. 30.
 790 Transcript, May 17, 2011, p. 27.
 791 Transcript, May 17, 2011, p. 11; see also May 18, 2011, pp. 1–2.
 792 Transcript, May 17, 2011, p. 48.
 793 Randy Nelson, Transcript, May 17, 2011, pp. 12, 85.
 794 Exhibit 32.
 795 Exhibit 268; see also PPR 12, pp. 28–29.
 796 Colin Masson, Transcript, May 12, 2011, p. 5; see also PPR 12, p. 28.
 797 Exhibit 268, p. 4.
 798 Exhibit 268, pp. 4–6.
 799 Transcript, May 12, 2011, pp. 5, 6.
 800 Exhibit 535, p. 5.
 801 Transcript, March 2, 2011, p. 71.
 802 Exhibit 606, pp. 15–18; see also PPR 12, p. 32, Appendix 1.
 803 Fisheries and Oceans Canada, *Building Capacity & Trust*, Response by Fisheries & Oceans Canada to the 2004 Southern Salmon Fishery Post-Season Review, June 2005.
 804 Exhibit 480.
 805 Peter Pearce and Donald McRae, *Treaties and Transitions: Towards a Sustainable Fishery on Canada's Pacific Coast*, Report of the Federal-Provincial Task Force, April 2004.
 806 Exhibit 493.
 807 Transcript, May 12, 2011, p. 7.
 808 Colin Masson, Transcript, May 12, 2011, p. 6; PPR 12, pp. 31–32.
 809 Exhibit 269, pp. 5–6.
 810 Exhibit 269, p. 27 (Appendix 1).
 811 PPR 12, pp. 37–38; Colin Masson, May 12, pp. 6–7.
 812 PPR 12, p. 37.
 813 Exhibit 270, p. 6; see also Colin Masson, Transcript, May 12, 2011, p. 8.
 814 Exhibit 270, p. 10.
 815 Transcript, May 12, 2011, p. 16.
 816 Exhibit 1437, p. 7; see also Julie Stewart, Transcript, August 19, 2011, p. 72.
 817 Exhibit 1437, pp. 8–10.
 818 Transcript, May 12, 2011, p. 16.
 819 Transcript, September 22, 2011, p. 13.
 820 Susan Farlinger, Transcript, September 22, 2011, pp. 20–21.
 821 PPR 12, p. 41.
 822 PPR 12, pp. 41–42.
 823 PPR 12, pp. 42–43.
 824 PPR 12, pp. 43–44.
 825 Exhibit 860; see also PPR 12, pp. 46–47.
 826 Exhibit 860, p. 2; see also PPR 12, p. 47.
 827 Exhibit 855.
 828 Transcript, May 12, 2011, p. 14; see also Susan Farlinger, Transcript, September 26, 2011, p. 20.
 829 Exhibit 429, pp. 1, 5.
 830 Transcript, May 11, 2011, p. 23.
 831 Exhibit 429, pp. 8–11.
 832 Exhibit 429, pp. 12–20.
 833 Transcript, September 26, 2011, p. 19.
 834 Transcript, September 22, 2011, pp. 20–21.
 835 Transcript, May 12, 2011, p. 14.
 836 Exhibit 473; see also PPR 12, pp. 39–41.
 837 PPR 12, p. 39.
 838 Gerry Kristianson, Transcript, February 1, 2011, pp. 76–77; see also Pat Matthew, Transcript, February 1, 2011, p. 81.
 839 Exhibit 429, p. 6; see also PPR 12, pp. 40–41; Colin Masson, Transcript, May 12, 2011, pp. 8–9.
 840 Exhibit 855, p. 17 (Appendix 2); see also PPR 12, pp. 45–50; Colin Masson, Transcript, May 12, 2011, p. 9.
 841 Transcript, May 12, 2011, p. 9.
 842 Transcript, July 5, 2011, p. 27.
 843 Exhibit 855, cover; Colin Masson, Transcript, May 12, 2011, p. 11; see also PPR 11, pp. 53–54.
 844 Exhibit 428; Exhibit 855.
 845 Transcript, May 12, 2011, p. 12.
 846 Transcript, May 12, 2011, p. 20.
 847 Exhibit 855, pp. 5–6; see also PPR 12, pp. 47–48.
 848 Exhibit 855, p. 10; see also PPR 12, pp. 45–46.
 849 Transcript, May 12, 2011, p. 34.
 850 Exhibit 855, p. 12.
 851 Exhibit 855, p. 12.
 852 Ken Malloway, Transcript, May 12, 2011, p. 35; Colin Masson, Transcript, May 12, 2011, pp. 36, 45.
 853 Colin Masson, Transcript, May 12, 2011, p. 25.
 854 Matthew Parslow, Transcript, May 11, 2011, p. 15; Colin Masson, Transcript, May 12, 2011, p. 45.
 855 Transcript, May 11, 2011, pp. 20–21.
 856 Transcript, May 12, 2011, p. 19.
 857 Exhibit 841.
 858 Exhibit 843; Exhibit 844.
 859 Transcript, March 2, 2011, p. 73.
 860 Exhibit 68; Exhibit 69; Mike Lapointe, Transcript, January 18, 2011, pp. 75–76; Barry Rosenberger, Transcript, January 21, 2011, p. 30; see also PPR 5, pp. 102–3.
 861 Mike Lapointe, Transcript, November 8, 2010, p. 36; see also Exhibit 70; Exhibit 602; Exhibit 603; Exhibit 74.
 862 Barry Rosenberger, Transcript, January 21, 2011, p. 31; Exhibit 330; Exhibit 338; Exhibit 339.
 863 Barry Rosenberger, Transcript, January 21, 2011, pp. 32–33.
 864 Barry Rosenberger, Transcript, January 21, 2011, p. 34.
 865 Transcript, January 18, 2011, p. 80.
 866 Transcript, January 18, 2011, p. 25.
 867 Transcript, January 18, 2011, pp. 79–80.
 868 Exhibit 333.
 869 Exhibit 333, p. 1.
 870 Exhibit 333, p. 2; Mike Lapointe, Transcript, January 18, 2011, p. 82.
 871 Mike Lapointe, Transcript, January 18, 2011, p. 83.
 872 Mike Lapointe, Transcript, January 18, 2011, p. 80.
 873 Mike Lapointe, Transcript, January 18, 2011, pp. 80, 83, 84.
 874 Transcript, January 18, 2011, pp. 86, 90.
 875 Brian Riddell, Transcript, February 2, 2011, p. 42; Exhibit 65, pp. 7 (Article III, para. 3(c)), (Diplomatic Note of August 13, 1985, para. F); see also Timber Whitehouse, Transcript, February 2, 2011, pp. 49–50; PPR 5, pp. 66–67.
 876 Transcript, February 3, 2011, p. 31.
 877 Transcript, February 2, 2011, pp. 4, 31.
 878 Transcript, February 2, 2011, pp. 4–5.
 879 Transcript, February 2, 2011, p. 7.
 880 Transcript, February 2, 2011, pp. 13–14.
 881 Transcript, February 2, 2011, p. 29.
 882 Transcript, February 2, 2011, p. 32.
 883 Transcript, February 2, 2011, pp. 30–32.
 884 Timber Whitehouse, Transcript, February 2, 2011, p. 33.
 885 Transcript, February 11, 2011, pp. 17–18.
 886 Timber Whitehouse, Transcript, February 2, 2011, pp. 33–35, 36; February 3, 2011, pp. 24–25; Exhibit 380.

- 887 Timber Whitehouse, Transcript, February 2, 2011, pp. 4–5.
 888 Timber Whitehouse, Transcript, February 2, 2011, p. 7.
 889 Transcript, February 2, 2011, pp. 10–11.
 890 Timber Whitehouse, Transcript, February 2, 2011, pp. 13–14.
 891 Transcript, February 2, 2011, pp. 17–18.
 892 Timber Whitehouse, Transcript, February 2, 2011, p. 38.
 893 Brian Riddell, Transcript, February 2, 2011, p. 38.
 894 Public submission 0129-RSSEPS_866070, available at www.cohencommission.ca.
 895 Brian Riddell, Transcript, February 2, 2011, p. 39.
 896 Brian Riddell, Transcript, February 2, 2011, pp. 39–40.
 897 Brian Riddell, Transcript, February 2, 2011, p. 40.
 898 Transcript, February 2, 2011, p. 54.
 899 Timber Whitehouse, Transcript, February 2, 2011, p. 12; February 3, 2011, pp. 9–10.
 900 Brian Riddell, Transcript, February 2, 2011, pp. 42, 59, 62–63; Timber Whitehouse, Transcript, February 2, 2011, pp. 61–62.
 901 Transcript, February 3, 2011, p. 31.
 902 Aboriginal assertions of rights are found in several exhibits, including the following: Exhibit 493, p. 76; Exhibit 1747, pp. 2–3; Exhibit 1190.
 903 *Rigaux v. Gove* (1998) 155 DLR (4th) 716 (BCSC); 51 BCLR (3d) 228 at para. 25.
 904 Submissions on Aboriginal law: PPR 1a, pp. 1–2; PPR 1b, p. 9; PPR 1c, pp. 2–3; PPR 1f, p. 18; PPR 1g, p. 2; see also Musqueam and Tsawwassen, Transcript, October 26, 2010, p. 29; Western Central Coast Salish, Transcript, October 26, p. 36.
 905 Transcript, September 2, 2011, pp. 71–72.
 906 Kaarina McGivney, Transcript, September 2, 2011, pp. 25, 52; see also Exhibit 1270, p. 1. Barry Rosenberger told me that the Department of Indian and Northern Affairs holds responsibility for “the rights and titles side of things,” whereas DFO is focused on managing the fisheries (Transcript, July 4, 2011, p. 66).
 907 Kaarina McGivney, Transcript, September 2, 2011, pp. 52–53.
 908 Transcript, September 2, 2011, p. 14.
 909 Kaarina McGivney, Transcript, September 2, 2011, pp. 14–15.
 910 Exhibit 1752, p. 10; PPR 18, p. 46; *R. v. Sparrow* is described in greater detail in Chapter 3, Legal framework.
 911 Exhibit 1270, p. 2; Kaarina McGivney, Transcript, August 19, 2011, p. 11.
 912 PPR 18, p. 47.
 913 Exhibit 290, p. 8.
 914 PPR 18, p. 53.
 915 Exhibit 1187, p. 16; Exhibit 1189, p. 2.
 916 PPR 18, p. 53.
 917 Exhibit 1430, including preliminary data for fiscal year 2010/11 provided as at December 2010.
 918 Exhibit 1429 (numbers rounded to the nearest \$100,000).
 919 Exhibit 261.
 920 Exhibit 261, p. 3.
 921 Kaarina McGivney, Transcript, September 2, 2011, pp. 14–15.
 922 Exhibit 261.
 923 Exhibit 1752, p. 41.
 924 PPR 18, p. 70; see also Exhibit 1752, p. 41.
 925 PPR 18, pp. 70–71.
 926 PPR 18, p. 71.
 927 PPR 18, p. 73.
 928 PPR 18, p. 73.
 929 Exhibit 1429 (numbers rounded to the nearest \$100,000).
 930 Exhibit 1442, p. 2 (as at January 2011).
 931 Exhibit 1442, p. 2.
 932 PPR 18, p. 78.
 933 PPR 18, p. 78.
 934 PPR 18, p. 81.
 935 PPR 18, p. 78.
 936 PPR 18, pp. 78–79.
 937 Exhibit 290, p. 8.
 938 PPR 18, p. 81.
 939 Exhibit 1430, p. 5.
 940 Exhibit 1430, p. 4.
 941 PPR 18, pp. 32–33.
 942 PPR 18, pp. 31–32.
 943 Exhibit 270, p. 1.
 944 Exhibit 270, p. 5.
 945 Exhibit 270, p. 12.
 946 PPR 18, p. 90; note that a further \$26 million is set aside for implementation of PICFI.
 947 PPR 18, pp. 85–86.
 948 PPR 18, p. 86.
 949 PPR 18, pp. 86–87.
 950 PPR 18, pp. 87–88; Julie Stewart, Transcript, August 19, 2011, p. 43.
 951 Exhibit 1430, pp. 3, 6.
 952 Exhibit 1442, p. 2 (as at January 2011).
 953 Exhibit 1426, p. 1; see also Kaarina McGivney, Transcript, August 19, 2011, p. 30.
 954 Exhibit 1426, p. 1.
 955 Exhibit 1426, p. 3.
 956 Kaarina McGivney, Transcript, August 19, 2011, p. 55.
 957 Exhibit 1426, p. 2; Kaarina McGivney, Transcript, August 19, 2011, pp. 38–39.
 958 PPR 18, p. 21 and following.
 959 Exhibit 1429; Exhibit 1428.
 960 Exhibit 1428.
 961 Exhibit 1429.
 962 Exhibit 1429 (numbers rounded to the nearest \$100,000).
 963 Exhibit 1430, p. 1, preliminary data for fiscal year 2010/11 provided at December 2010.
 964 Exhibit 1430.
 965 Transcript, July 4, 2011, p. 49.
 966 Transcript, June 28, 2011, p. 27.
 967 Kaarina McGivney, Transcript, August 19, 2011, p. 3.
 968 Transcript, September 2, 2011, p. 68.
 969 Exhibit 279, p. 2.
 970 Exhibit 281, p. 1; Exhibit 282, p. 2.
 971 Exhibit 278, p. 4.
 972 Exhibit 280, p. 1.
 973 Exhibit 291, p. 2.
 974 Exhibit 293, p. 2.
 975 Exhibit 278, pp. 3–4.
 976 Clarence Pennier, Transcript, December 13, 2010, p. 17.
 977 Exhibit 281, p. 1.
 978 Exhibit 298, p. 2.
 979 Exhibit 297, p. 4.
 980 Kaarina McGivney, Transcript, August 19, pp. 7–8; Transcript, September 2, 2011, p. 61.
 981 Transcript, September 2, 2011, p. 69.
 982 Transcript, August 19, 2011, p. 7.
 983 Exhibit 1421.
 984 Exhibit 300, p. 3; Exhibit 280, p. 2; Transcript, December 13, 2010, p. 18.
 985 Exhibit 279, pp. 2, 4; Transcript, December 13, 2010, pp. 27–30.
 986 Transcript, July 4, 2011, pp. 28–29.
 987 Barry Huber, Transcript, June 30, 2011, pp. 36–37; Kaarina McGivney, Transcript, August 19, 2011, p. 3; Exhibit 1279, p. 5.
 988 Kaarina McGivney, Transcript, August 19, 2011, p. 3; see, for example, Exhibit 1226; also Exhibit 1432; Kaarina McGivney, Transcript, August 19, 2011, pp. 64–65.
 989 Kaarina McGivney, Transcript, August 19, 2011, p. 4; Exhibit 1279, p. 5.
 990 Exhibit 261, p. 5.
 991 Transcript, August 19, 2011, p. 4.
 992 Kaarina McGivney, Transcript, August 19, 2011, p. 6.
 993 Exhibit 1189, p. 23.
 994 Exhibit 1741, p. 3; Kaarina McGivney, Transcript, September 2, 2011, p. 26.

- 995 Kaarina McGivney, Transcript, August 19, 2011, p. 7; see also Kaarina McGivney, Transcript, September 2, 2011, p. 61.
- 996 Exhibit 1433, Draft example.
- 997 See also Exhibit 1744, p. 2.
- 998 Exhibit 301, p. 2.
- 999 Transcript, December 13, 2010, p. 56.
- 1000 Transcript, July 4, 2011, p. 101.
- 1001 Transcript, December 15, 2010, p. 36.
- 1002 Exhibit 303.
- 1003 Transcript, June 30, 2011, p. 38.
- 1004 Transcript, July 4, 2011, p. 30.
- 1005 Transcript, August 19, 2011, p. 5.
- 1006 Transcript, July 4, 2011, p. 32.
- 1007 Transcript, December 13, 2010, p. 78.
- 1008 Transcript, June 30, 2011, p. 38.
- 1009 PPR 18, Table 4, p. 43.
- 1010 Kaarina McGivney, Transcript, September 2, 2011, p. 34; see also Edwin Newman, Transcript, December 15, 2010, p. 68.
- 1011 Exhibit 1225, p. 3.
- 1012 Transcript, July 5, 2011, p. 53.
- 1013 Ross Wilson, Transcript, July 4, 2011, p. 102; Exhibit 1744, p. 1.
- 1014 Exhibit 493, p. 75.
- 1015 Exhibit 1189, p. 13.
- 1016 Exhibit 1744, p. 2.
- 1017 Exhibit 1221, PPR 18, Table 1, p. 40.
- 1018 Exhibit 1221, PPR 18, Table 2, p. 41.
- 1019 Exhibit 1277, p. 10.
- 1020 Exhibit 1225, p. 3.
- 1021 Exhibit 1279, p. 5.
- 1022 Exhibit 1279, pp. 8–9.
- 1023 Exhibit 1221; Exhibit 1275; Exhibit 1276, p. 4.
- 1024 Exhibit 1276, pp. 3, 5, 6.
- 1025 Transcript, July 5, 2011, p. 43.
- 1026 Barry Huber, Transcript, June 30, 2011, p. 37; Kaarina McGivney, Transcript, August 19, 2011, pp. 3–4.
- 1027 Kaarina McGivney, Transcript, August 19, 2011, p. 4; Barry Huber, Transcript, June 30, 2011, pp. 79–80; Exhibit 1226, p. 4.
- 1028 Exhibit 1226, p. 4.
- 1029 Barry Huber, Transcript, June 30, 2011, p. 81.
- 1030 Exhibit 1226, pp. 4, 10–11.
- 1031 PPR 18, p. 112; Kaarina McGivney, Transcript, August 19, 2011, p. 30.
- 1032 Kaarina McGivney, Transcript, August 19, 2011, pp. 30, 34; see also Exhibit 1279, p. 3.
- 1033 Kaarina McGivney, Transcript, August 19, 2011, pp. 30–31.
- 1034 Kaarina McGivney, Transcript, August 19, 2011, pp. 29, 30; Exhibit 1426.
- 1035 Exhibit 1279, p. 1; see also Ruling Re: Heiltsuk Tribal Council's Application for Production of FSC "Mandate Documents"; Coastwide Framework Documents, September 20, 2011, p. 15.
- 1036 Kaarina McGivney, Transcript, August 19, 2011, pp. 29, 31.
- 1037 Julie Stewart and Kaarina McGivney, Transcript, August 19, 2011, pp. 80–81.
- 1038 Kaarina McGivney, Transcript, August 19, 2011, p. 55.
- 1039 Exhibit 1426, p. 2; Kaarina McGivney, Transcript, August 19, 2011, pp. 38–39.
- 1040 Exhibit 1279, p. 6.
- 1041 Kaarina McGivney, Transcript, August 19, 2011, p. 31; Transcript, September 2, 2011, p. 97.
- 1042 Kaarina McGivney, Transcript, August 19, 2011, pp. 31–32; Transcript, September 2, 2011, p. 96; Exhibit 493; Exhibit 1189.
- 1043 Transcript, August 19, 2011, pp. 38–39.
- 1044 Kaarina McGivney, Transcript, September 2, 2011, pp. 91–92.
- 1045 Kaarina McGivney, Transcript, September 2, 2011, pp. 91–92.
- 1046 Julie Stewart and Kaarina McGivney, Transcript, September 2, 2011, pp. 89–90; Exhibit 1437, p. 24.
- 1047 Exhibit 261, p. 5; Exhibit 264, p. 16; Exhibit 8, p. 2.
- 1048 PPR 18, Figure 9, p. 45.
- 1049 Transcript, June 30, 2011, p. 98.
- 1050 Transcript, December 15, 2010, pp. 68–69, 90.
- 1051 Transcript, July 5, 2011, p. 52; see also Exhibit 1260, p. 2.
- 1052 Exhibit 445, p. 141.
- 1053 PPR 18, p. 66.
- 1054 PPR 18, p. 66.
- 1055 Exhibit 1279, p. 11.
- 1056 PPR 18, pp. 68–69.
- 1057 Exhibit 1279, p. 11; PPR 18, pp. 68–69.
- 1058 Transcript, September 2, 2011, p. 12.
- 1059 Kaarina McGivney, Transcript, August 19, 2011, p. 11.
- 1060 Transcript, September 2, 2011, pp. 5, 6, 10.
- 1061 Exhibit 1279, p. 11.
- 1062 Exhibit 1442, p. 2 (as at January 2011).
- 1063 Exhibit 1442, p. 2 (as at January 2011).
- 1064 Exhibit 1747, p. 15.
- 1065 Exhibit 1747, pp. 1–2.
- 1066 Exhibit 1747, p. 3.
- 1067 Exhibit 1747, p. 2.
- 1068 Exhibit 1279, p. 12.
- 1069 Exhibit 291, pp. 1, 5.
- 1070 Transcript, June 28, 2011, p. 66.
- 1071 Exhibit 291, p. 1.
- 1072 Transcript, August 19, 2011, p. 27, referring to in-river economic opportunity fisheries specifically.
- 1073 Transcript, June 28, 2011, p. 64.
- 1074 Exhibit 1747, p. 4; Russ Jones, Transcript, June 28, 2011, p. 68; see also Julie Stewart, Transcript, September 2, 2011, p. 41.
- 1075 Exhibit 1747, pp. 5, 7.
- 1076 Exhibit 1746, p. 7.
- 1077 Exhibit 1746, p. 7; as of August 31, 2010, though six agreements were "in negotiations."
- 1078 Exhibit 1746, p. 35.
- 1079 Exhibit 1746, pp. 9, 37.
- 1080 Exhibit 1277, p. 7.
- 1081 Exhibit 1277, p. 3.
- 1082 Exhibit 729, p. 13.
- 1083 Exhibit 261, p. 7.
- 1084 Exhibit 261, pp. 2–3.
- 1085 Exhibit 1189, p. 2.
- 1086 Exhibit 729, p. 31.
- 1087 Exhibit 1186.
- 1088 Exhibit 290, p. 10; also, Exhibit 1186, p. 2.
- 1089 Exhibit 1186, pp. 1, 2; see also Barry Huber, Transcript, June 28, 2011, p. 8.
- 1090 PPR 18, p. 132.
- 1091 Transcript, June 28, 2011, p. 8; Exhibit 290, p. 8.
- 1092 Saul Terry, Transcript, June 28, 2011, p. 9; see also Exhibit 1186, p. 8 (section 12.1).
- 1093 Marcel Shepert, Transcript, July 4, 2011, pp. 45–46.
- 1094 Exhibit 77.
- 1095 Exhibit 77, p. 56.
- 1096 Exhibit 77, p. 66.
- 1097 Exhibit 77, p. 45.
- 1098 Exhibit 77, p. 66.
- 1099 PPR 18, p. 50. However, the Fraser River Aboriginal Fisheries Secretariat has continued to receive DFO funding and maintains a role in facilitating dialogue between DFO and First Nations. See Exhibit 1181 for a description of FRAFS activities and funding.
- 1100 Ernie Crey, Transcript, July 4, 2011, pp. 63–64.
- 1101 Exhibit 1923, p. 28.
- 1102 PPR 18, p. 57.
- 1103 Exhibit 604, p. 33.
- 1104 Exhibit 1431, p. 11.
- 1105 Exhibit 1431, p. 11.

- 1106 Exhibit 493.
 1107 *Treaties and Transitions*, p. 28.
 1108 *Treaties and Transitions*, pp. 26–27.
 1109 *Treaties and Transitions*, p. 27.
 1110 *Treaties and Transitions*, p. 46.
 1111 Exhibit 493, p. 2.
 1112 Exhibit 493, p. 10.
 1113 Exhibit 493, p. 4.
 1114 PPR 18, pp. 78, 81.
 1115 Exhibit 480, p. 4.
 1116 Exhibit 1189, p. 3.
 1117 Exhibit 269, p. 7.
 1118 Exhibit 480, p. 11.
 1119 Exhibit 480, p. 14.
 1120 Exhibit 269, p. 24.
 1121 Exhibit 606, p. 46.
 1122 Exhibit 606, p. 47.
 1123 Exhibit 606, p. 47.
 1124 Exhibit 8.
 1125 Exhibit 8, p. 32.
 1126 Exhibit 8, p. 27.
 1127 Exhibit 8, p. 2.
 1128 Exhibit 8, p. 29.
 1129 Exhibit 1187, p. 13.
 1130 Exhibit 1187, p. 20.
 1131 Exhibit 1187, p. 13.
 1132 Exhibit 1187, p. 21.
 1133 Kaarina McGivney, Transcript, August 19, 2011, pp. 43–44.
 1134 Exhibit 290, p. 1; see also Exhibit 1220, p. 2.
 1135 Exhibit 290, p. 2; see also Exhibit 1188.
 1136 Exhibit 1220, p. 1.
 1137 Exhibit 1277, p. 7.
 1138 Kaarina McGivney, Transcript, August 19, 2011, p. 43;
 Barry Huber, Transcript, June 28, 2011, pp. 12–13; see also
 Exhibit 1206a, p. 5; Exhibit 1259, p. 5.
 1139 Exhibit 269, p. 19; Exhibit 1187, p. 20; Barry Huber,
 Transcript, June 28, 2011, pp. 12–13.
 1140 Kaarina McGivney, Transcript, August 19, 2011, p. 93;
 Julie Stewart, Transcript, August 19, 2011, p. 94;
 Barry Rosenberger, Transcript, July 5, 2011, p. 49;
 Exhibit 1751, pp. 8–9.
 1141 See, for example, Neil Todd, Transcript, June 28, 2011, p. 14.
 1142 Exhibit 1204, p. 4.
 1143 Transcript, December 13, 2010, p. 21.
 1144 Exhibit 1258, p. 1; Exhibit 1259, p. 6.
 1145 Transcript, August 19, 2011, p. 45; Transcript, September 2,
 2011, p. 75; Exhibit 1426, p. 1.
 1146 Transcript, June 28, 2011, p. 10.
 1147 Transcript, September 26, 2011, p. 5.
 1148 See, for example, Saul Terry, Transcript, June 28, 2011, p. 15;
 Exhibit 1259, p. 3; June Quipp, Transcript, December 13, 2010,
 p. 83; Ross Wilson, Transcript, July 4, 2011, p. 105; Ernie Crey,
 Transcript, July 5, 2011, pp. 67–68.
 1149 See, for example, Fred Sampson, Transcript, December 14,
 2010, p. 14; Ron Ignace, Transcript, December 14, 2010, p. 36;
 Ross Wilson, Transcript, July 5, 2011, p. 48.
 1150 Exhibit 1189, pp. 7, 8.
 1151 Exhibit 295, p. 3.
 1152 Exhibit 295, p. 11.
 1153 Exhibit 493, p. 76.
 1154 Exhibit 295, p. 9.
 1155 Exhibit 278, p. 5.
 1156 Transcript, July 4, 2011, p. 51.
 1157 Transcript, July 4, 2011, p. 55.
 1158 See for example, Exhibit 291, p. 4; Marcel Shepert, Ernie
 Crey, and Ross Wilson, Transcript, July 4, 2011, pp. 9–10;
 Exhibit 293, p. 3; Saul Terry, Transcript, December 14, 2010,
 p. 23.
 1159 See, for example, Pat Matthew, Transcript, February 1, 2011,
 p. 11.
 1160 See, for example, Russ Jones, Transcript, June 28, 2011, p. 16.
 1161 Exhibit 293, p. 3.
 1162 Transcript, June 28, 2011, p. 45.
 1163 Transcript, July 5, 2011, p. 73.
 1164 Transcript, June 28, 2011, p. 14.
 1165 See, for example, Kaarina McGivney, Transcript, September
 2, 2011, pp. 55, 64; Julie Stewart, Transcript, September 2,
 2011, p. 64.
 1166 Transcript, July 4, 2011, p. 38; Transcript, July 5, 2011, pp. 12–13.
 1167 Transcript, February 1, 2011, p. 9.
 1168 Exhibit 8, p. 28.
 1169 Exhibit 291, p. 5; Russ Jones, Transcript, June 28, 2011, p. 44.
 1170 See, for example, Ernie Crey, Transcript, July 4, 2011, p. 13;
 Robert Mountain, Transcript, December 15, 2010, p. 26;
 Exhibit 279, p. 6; Exhibit 281, p. 2.
 1171 Transcript, September 2, 2011, p. 86.
 1172 Transcript, July 4, 2011, p. 8.
 1173 Exhibit 1429.
 1174 Kaarina McGivney, Transcript, August 19, 2011, p. 46; see
 also Exhibit 1429.
 1175 Exhibit 296.
 1176 See, for example, Rod Naknakim, Transcript, December 15,
 2010, p. 84.
 1177 Ross Wilson, Marcel Shepert, Ernie Crey, Transcript, July 5,
 2011, pp. 63–64; see also Ernie Crey, Transcript, July 4, 2011,
 p. 9.
 1178 Exhibit 1206A, p. 4.
 1179 Exhibit 1206A, p. 10.
 1180 Exhibit 1206A, p. 10.
 1181 PPR 18, p. 97.
 1182 PPR 18, p. 100 (Table 9).
 1183 Exhibit 493, p. 17; Exhibit 1189, p. 2.
 1184 PPR 1, para. 135, n. 242.
 1185 PPR 18, Table 9, p. 100.
 1186 PPR 18, Table 9, p. 100.
 1187 PPR 18, Table 9, p. 100.
 1188 PPR 18, Table 9, p. 100.
 1189 Exhibit 493, p. 18.
 1190 Exhibit 1189, p. 21.
 1191 Exhibit 1279, p. 3.
 1192 Exhibit 1279; Exhibit 1426.
 1193 Exhibit 1279, p. 2.
 1194 Exhibit 1279, p. 3.
 1195 Kimberley Baird, Transcript, December 13, 2010, p. 13.
 1196 Exhibit 285; Exhibit 286.
 1197 Exhibit 1279, pp. 15–16, 20.
 1198 Exhibit 1279, pp. 15–16; see, for example, Exhibit 1447, p. 99.
 1199 Transcript September 2, 2011, p. 86.
 1200 Guujaaw, Transcript, December 15, 2010, p. 58;
 Kaarina McGivney, Transcript, August 19, 2011, p. 35.
 1201 Exhibit 269, p. 7.
 1202 Transcript September 2, 2011, p. 87.
 1203 Exhibit 1426, p. 3.
 1204 Exhibit 1279, p. 4.
 1205 PPR 18, pp. 103–4.
 1206 Exhibit 493, p. 65.
 1207 Transcript, December 13, 2010, p. 66.
 1208 Exhibit 1279, p. 16; see also Kaarina McGivney, Transcript,
 August 19, 2011, pp. 36–37.
 1209 Exhibit 1279, p. 5.
 1210 Exhibit 1279, p. 5.
 1211 Exhibit 281, p. 1.
 1212 Exhibit 1279, p. 6.
 1213 Exhibit 1279, p. 9.
 1214 Exhibit 287, p. 265.
 1215 PPR 18, p. 153 (Appendix 3); Exhibit 1279, p. 8.

- 1216 Kaarina McGivney, Transcript, August 19, 2010, p. 86; Exhibit 1279, p. 10.
- 1217 Exhibit 1279, pp. 4, 11.
- 1218 PPR 18, p. 161 (Appendix 4).
- 1219 Exhibit 1279, pp. 11, 12, 14.
- 1220 Exhibit 1279, pp. 11, 13.
- 1221 *R. u. Sappier; R. u. Gray*, [2006] 2 SCR 686, 2006 SCC 54, at para. 26.
- 1222 *R. u. Sparrow*, at para. 78.
- 1223 See also PPR 6, pp. 62–79.
- 1224 Exhibit 493.
- 1225 Exhibit 480.
- 1226 Exhibit 269.
- 1227 Exhibit 480, p. 8.
- 1228 Exhibit 480, pp. 9–10.
- 1229 Exhibit 269, p. 5.
- 1230 Exhibit 269, pp. 12, 16; see also PPR 6, pp. 66–67.
- 1231 Exhibit 269, pp. 17–19.
- 1232 Exhibit 472; see also PPR 6, pp. 67–70.
- 1233 Exhibit 270; Exhibit 472, p. iii (Executive Summary).
- 1234 Exhibit 471; Exhibit 469, p. 3.
- 1235 Exhibit 469, p. 9.
- 1236 Exhibit 469, pp. 9–11; see also Marcel Shepert, Transcript, July 5, 2011, pp. 64–65.
- 1237 Exhibit 469, p. 15.
- 1238 Exhibit 469, p. 18.
- 1239 Transcript, February 23, 2011, p. 45.
- 1240 Transcript, February 23, 2011, p. 45.
- 1241 Transcript, February 23, 2011, p. 45.
- 1242 Jeff Grout, Transcript, February 23, 2011, pp. 88–89.
- 1243 Transcript, February 23, 2011, p. 82. See also PPR 6, paras. 173 and 174 and n. 205: Presentation: Supporting Integrated Commercial Salmon Fisheries: Moving to Share Based Management (Community Dialogues – Fall, 2008) (“The Department expects SBM to result in the following benefits for the salmon fishery: ‘Conservation and fisheries sustainability facilitated; Addressing Wild Salmon Policy objectives – selective harvest; Lower fishing effort reduces risk of over-fishing ...’”).
- 1244 Transcript, September 22, 2011, p. 69.
- 1245 Transcript, February 23, 2011, p. 29.
- 1246 Transcript, February 23, 2011, p. 92; see also Transcript, February 24, 2011, p. 18.
- 1247 Transcript, February 24, 2011, p. 23.
- 1248 Transcript, February 22, 2011, p. 27.
- 1249 Transcript, March 1, 2011, p. 25.
- 1250 Transcript, February 22, p. 25.
- 1251 Transcript, February 22, 2011, p. 29.
- 1252 Transcript, February 22, 2011, p. 29; Transcript, February 28, 2011, p. 32.
- 1253 Transcript, March 1, 2011, p. 20.
- 1254 Transcript, February 22, 2011, p. 27.
- 1255 Transcript, February 22, 2011, p. 28.
- 1256 Public submission 0255-BARKUSKY, available at www.cohencommission.ca.
- 1257 Public submission 0271-REZANSOFF, available at www.cohencommission.ca.
- 1258 Jeff Grout, Transcript, February 23, 2011, p. 37.
- 1259 Exhibit 466 (2003); Exhibit 467 (2006).
- 1260 Exhibit 465.
- 1261 Exhibit 466, p. 1.
- 1262 Exhibit 467, pp. 7, 10.
- 1263 Exhibit 461, p. 1; see also Jeff Grout, Transcript, February 23, 2011, pp. 33–35.
- 1264 Exhibit 465, p. 41.
- 1265 Jeff Grout, Transcript, February 23, 2011, p. 32.
- 1266 Peter Sakich, Transcript, February 22, 2011, p. 28.
- 1267 Exhibit 470.
- 1268 Exhibit 470, pp. 1–2.
- 1269 Exhibit 470, p. 4.
- 1270 Exhibit 470, pp. 4–5.
- 1271 Exhibit 470, pp. 5–6.
- 1272 Transcript, February 23, 2011, p. 49; Transcript February 24, 2011, p. 44.
- 1273 Jeff Grout, Transcript, February 23, 2011, p. 50.
- 1274 Transcript, September 22, 2011, pp. 69–70.
- 1275 Jeff Grout, Transcript, February 23, 2011, pp. 18, 51; see also Claire Dansereau, September 22, 2011, p. 69.
- 1276 Transcript, September 22, 2011, pp. 73–74.
- 1277 Written submissions of the Seafood Producers Association of B.C., p. 9, and of the Area D Salmon Gillnet Association and Area B Harvest Committee (Seine), p. 75, available at www.cohencommission.ca.
- 1278 Written submissions of the B.C. Wildlife Federation and of the B.C. Federation of Drift Fishers, pp. 34–35, available at www.cohencommission.ca.
- 1279 Area G’s written submissions, pp. 71–72, available at www.cohencommission.ca.
- 1280 First Nations Coalition’s written submissions, p. 309, available at www.cohencommission.ca.
- 1281 Stó:lō Tribal Council and Cheam Indian Band’s written submissions, pp. 61–62, 101, available at www.cohencommission.ca.
- 1282 Canada’s written submissions, p. 164; Conservation Coalition’s written submissions, p. 12; First Nations Coalition’s written submissions, p. 285, available at www.cohencommission.ca.
- 1283 Canada’s written submissions, p. 164, available at www.cohencommission.ca.
- 1284 Conservation Coalition’s written submissions, p. 12, available at www.cohencommission.ca.
- 1285 First Nations Coalition’s written submissions, p. 285, available at www.cohencommission.ca.
- 1286 First Nations Coalition’s written submissions, pp. 289–90, available at www.cohencommission.ca.
- 1287 Stó:lō Tribal Council and Cheam Indian Band’s reply submissions, p. 21, available at www.cohencommission.ca.
- 1288 Written submissions of the Seafood Producers Association of B.C., pp. 8–9, 11, available at www.cohencommission.ca.
- 1289 Written submissions of the Area D Salmon Gillnet Association and Area B Harvest Committee (Seine), pp. 52–53, available at www.cohencommission.ca.
- 1290 Written submissions of the West Coast Trollers Area G Association and the United Fishermen and Allied Workers’ Union, pp. 69–70, available at www.cohencommission.ca.
- 1291 Western Central Coast Salish First Nations’ written submissions, p. 28, available at www.cohencommission.ca.
- 1292 Laich-kwil-tach Treaty Society’s written submissions, pp. 10–12, available at www.cohencommission.ca.
- 1293 Exhibit 75, pp. 261–62.
- 1294 PPR 18, pp. 66–67.
- 1295 PPR 12, pp. 70–71.
- 1296 PPR 18, p. 64; Exhibit 264, p. 37.
- 1297 PPR 18, p. 65, Exhibit 264, p. 37.
- 1298 Kaarina McGivney, Transcript, August 19, 2011, p. 57; PPR 18, pp. 64–64.
- 1299 PPR 18, p. 70.
- 1300 PPR 18, p. 70.
- 1301 Exhibit 1423.
- 1302 Exhibit 1423, p. 2.
- 1303 Exhibit 1423, p. 2.
- 1304 Exhibit 1423, p. iv.
- 1305 Exhibit 1423, pp. 14–15.
- 1306 Exhibit 1423, p. 15.
- 1307 Exhibit 1333, p. 2.
- 1308 Exhibit 1333, p. 2.
- 1309 PPR 18, p. 90.

- 1310 PPR 18, pp. 70, 86; Paul Sprout, Transcript, March 4, 2011, p. 50.
 1311 PPR 18, p. 86; Exhibit 1437, p. 24.
 1312 Exhibit 1437, p. 24.
 1313 PPR 18, pp. 86–87, 90.
 1314 Transcript, December 16, 2010, p. 11.
 1315 Transcript, September 22, 2011, p. 63.
 1316 Transcript, August 19, 2011, pp. 12, 58.
 1317 Transcript, January 21, 2011, p. 66.
 1318 Exhibit 269, p. 27.
 1319 Transcript, March 15, 2011, p. 58.
 1320 Exhibit 1442.
 1321 Transcript, August 19, 2011, p. 14; see also Exhibit 1422.
 1322 Transcript, August 19, 2011, p. 13.
 1323 Transcript, August 19, 2011, p. 13.
 1324 Barry Rosenberger, Transcript, July 5, 2011, p. 18.
 1325 Exhibit 1274, p. 7.
 1326 Kaarina McGivney, Transcript, August 19, 2011, p. 15.
 1327 Transcript, July 5, 2011, pp. 20–21.
 1328 Jeff Grout, Transcript, February 23, 2011, pp. 31–32.
 1329 Barry Rosenberger, Transcript, July 5, 2011, p. 65.
 1330 Transcript, June 28, 2011, p. 66.
 1331 Transcript, January 25, 2011, pp. 36–37.
 1332 Jeff Grout, Transcript, January 25, 2011, p. 37.
 1333 Transcript, September 2, 2011, p. 44.
 1334 Transcript, August 19, 2011, pp. 17–18.
 1335 Transcript, May 12, 2011, p. 21.
 1336 Transcript, August 19, 2011, pp. 26–27.
 1337 Transcript, September 22, 2011, p. 68.
 1338 Transcript, September 22, 2011, pp. 68–69.
 1339 Exhibit 294, p. 5.
 1340 Exhibit 291, p. 5; Exhibit 292, p. 7.
 1341 Transcript, September 22, 2011, pp. 65–66.
 1342 Transcript, August 19, 2011, p. 18.
 1343 Transcript, September 2, 2011, p. 48.
 1344 Transcript, August 19, 2011, p. 26.
 1345 Exhibit 1747, p. 8.
 1346 Transcript, September 28, 2011, p. 57.
 1347 Exhibit 1746, p. 13.
 1348 Exhibit 1746, p. 22.
 1349 Transcript, July 5, 2011, p. 66.
 1350 Transcript, January 19, 2011, p. 15.
 1351 Transcript, January 21, 2011, pp. 8–9.
 1352 Exhibit 337; Jeff Grout, Transcript, January 21, 2011, pp. 24–25.
 1353 Ken Wilson, Transcript, February 8, 2011, p. 93;
 Michael Staley, Transcript, February 8, 2011, p. 95.
 1354 Jeff Grout, Transcript, January 21, 2011, p. 25.
 1355 Transcript, January 21, 2011, p. 25.
 1356 Jeff Grout, Transcript, January 21, 2011, p. 25.
 1357 Transcript, September 22, 2011, p. 67.
 1358 Transcript, April 15, 2011, p. 5.
 1359 Exhibit 718, p. 128.
 1360 Exhibit 718, p. 139.
 1361 Exhibit 718, p. 163.
 1362 Karl English, Transcript, April 14, 2011, p. 76.
 1363 Mike Lapointe, Transcript, January 19, 2011, p. 34.
 1364 Transcript, February 21, 2011, pp. 65–66.
 1365 Transcript, July 4, 2011, p. 74.
 1366 Gordon Curry, Transcript, February 21, 2011, pp. 58, 104;
 Brent Hargreaves, Transcript, February 21, 2011, p. 65.
 1367 Transcript, February 21, 2011, p. 106.
 1368 Transcript, September 28, 2011, p. 101.
 1369 Transcript, February 9, 2011, p. 56.
 1370 Transcript, September 27, 2011, pp. 33–34.
 1371 Exhibit 291, pp. 1, 5.
 1372 Exhibit 291, pp. 1, 5.
 1373 Transcript, December 15, 2010, p. 16.
 1374 Transcript, March 1, 2011, p. 64.
 1375 Transcript, January 25, 2011, p. 39.
 1376 Exhibit 1746, p. 6.
 1377 Barry Rosenberger, Transcript, January 25, 2011, p. 38.
 1378 Transcript, January 25, 2011, p. 38.
 1379 Transcript, March 1, 2011, pp. 42–43.
 1380 Transcript, January 25, 2011, p. 38.
 1381 Transcript, March 1, 2011, p. 43.
 1382 Scott Hinch, Transcript, March 8, 2011, p. 40.
 1383 Exhibit 553, p. 41.
 1384 Transcript, August 19, 2011, p. 17.
 1385 Barry Rosenberger, Transcript, January 24, 2011, pp. 80–81;
 Julie Stewart, Transcript, August 19, 2011, p. 91.
 1386 Transcript, April 15, 2011, p. 61.
 1387 Exhibit 1423.
 1388 Exhibit 1423, p. 3.
 1389 Exhibit 1423, p. 1.
 1390 Exhibit 1423, pp. iii, 4–5.
 1391 Exhibit 1423, p. iii.
 1392 Exhibit 1423, p. iv.
 1393 Exhibit 1423; Kaarina McGivney, Transcript, August 19, 2011,
 p. 19.
 1394 Bill Duncan, Transcript, March 1, 2011, p. 42; Gordon Curry,
 Transcript, February 21, 2011, pp. 65–66; Rob Morley, Tran-
 script, March 1, 2011, p. 43.
 1395 Transcript, March 1, 2011, p. 43.
 1396 Exhibit 1989.
 1397 Exhibit 1989, p. 2.
 1398 Exhibit 1989, p. 18.
 1399 Exhibit 1989, p. 17.
 1400 Exhibit 1989, p. 19.
 1401 Exhibit 1989, pp. 31–32.
 1402 Transcript, July 4, 2011, p. 74.
 1403 Exhibit 1261.
 1404 Exhibit 1261, pp. 31–33.
 1405 Transcript, July 4, 2011, p. 74.
 1406 Transcript, September 28, 2011, p. 58.
 1407 Transcript, August 19, 2011, pp. 18–19.
 1408 Transcript, September 22, 2011, p. 65.
 1409 Susan Farlinger, Transcript, September 22, 2011, pp. 63, 65;
 Kaarina McGivney, Transcript, August 19, 2011, p. 19.
 1410 Exhibit 1424, p. 2.
 1411 Exhibit 1424, pp. 2–3.
 1412 Exhibit 1424, p. 19.
 1413 Exhibit 1424, pp. 17–18.
 1414 Exhibit 1424, p. 18.
 1415 Transcript, August 19, 2011, p. 21.
 1416 Transcript, July 5, 2011, pp. 15–16.
 1417 Exhibit 1425.
 1418 Exhibit 1425, p. 18.
 1419 Exhibit 1425, pp. 17, 24.
 1420 Exhibit 1425, pp. 20–21.
 1421 Exhibit 1425, pp. 24–25.
 1422 Exhibit 1425, pp. 16, 24.
 1423 Exhibit 1425, p. 20.
 1424 Exhibit 1425, p. 26.
 1425 Exhibit 1425, p. 29.
 1426 Transcript, August 19, 2011, p. 23.
 1427 Transcript, September 2, 2011, p. 48.
 1428 Kaarina McGivney, Transcript, August 19, 2011, p. 20.
 1429 PPR 10, p. 20, Table 6.
 1430 PPR 10, p. 9, Table 1.
 1431 Transcript, January 21, 2011, pp. 29–30.
 1432 Exhibit 315, p. 3; Mike Lapointe, Transcript, January 20, 2011,
 p. 34.
 1433 Exhibit 1423, p. iii.
 1434 Transcript, September 22, 2011, p. 69.

Chapter 6 • Habitat management

■ Introduction

Early on in this Inquiry, an overarching theme emerged: the role of the Government of Canada in managing fish habitat. Habitat management encompasses many different topics, spans both the freshwater and marine environments, includes aquatic and terrestrial areas, and crosses jurisdictional boundaries from federal to provincial to regional. In this chapter, I summarize the evidence about habitat management.

I received many public submissions on issues of habitat management:

- Habitat loss is negatively affecting Fraser River sockeye salmon.¹
- Destruction of salmon habitat by development is a cause for the decline of Fraser River sockeye.²
- Less than 5 percent of salmon smolt habitat remains in the North Arm of the Fraser River.³
- Very few salt marshes remain in the Fraser River estuary, and they are critical for salmon populations as they acclimatize to the marine environment.⁴
- The remaining foreshore of the Fraser River estuary needs to be protected at all costs.⁵
- Habitat protection is lacking.⁶
- Habitat must be put ahead of development.⁷
- There is a problem with the Department of Fisheries and Oceans' (DFO's) principle of "No Net Loss" (see discussion later in this chapter) because one can destroy a natural stream bed and replace it with a man-made one somewhere else and call it No Net Loss.⁸
- The No Net Loss principle and professional reliance models are inadequate to protect habitat.⁹
- The professional reliance model should be abandoned and replaced by an independent, arm's-length review of all development proposals.¹⁰
- There are issues with the *Canadian Environmental Assessment Act* (CEAA)¹¹ and habitat compensation.¹²
- The province should create a wild salmon watershed reserve to protect habitat.¹³

- Salmon habitat is regularly compromised by industrial activity.¹⁴
- The paving of urban areas is affecting watersheds, and construction companies are dumping silt into the Fraser River watershed.¹⁵
- DFO is not upholding its *Fisheries Act*¹⁶ obligations and is allowing various kinds of development.¹⁷
- Development in riparian areas should be halted.¹⁸
- Government must enshrine its commitment under the *Fisheries Act* to protect fish habitat.¹⁹
- Preserving salmon habitat is cheaper than repairing it.²⁰
- The Neskonlith Indian Band is working with concerned citizens to protect the Salmon River delta from development.²¹
- the Habitat Management Program's regulatory oversight;
- habitat monitoring;
- water use;
- gravel removal;
- forestry;
- marine spill response;
- DFO Science's management of marine science issues;
- oceans management;
- non-point source contaminants;
- point source contaminants (municipal wastewater, pulp and paper, and metal mining effluents); and
- habitat enhancement and restoration.

Also, DFO witnesses told me that habitat is critical to fish production and that if current trends of habitat degradation and loss persist, there will be a significant ongoing decline in fish habitat, which will affect Fraser River sockeye productivity over time.²² As Randy Nelson, regional director of the Pacific Region's Conservation and Protection Branch, said, habitat in spawning and rearing areas and along all the migration routes, including the Fraser River estuary, is critically important for maintaining the productivity of these stocks.²³

Canada's Policy for Conservation of Wild Pacific Salmon (the Wild Salmon Policy or WSP, reproduced as Appendix B) explicitly acknowledges the importance of habitat to conserving Pacific salmon:

The health and long-term well-being of wild Pacific salmon is inextricably linked to the availability of diverse and productive freshwater, coastal, and marine habitats.

...

Identifying, protecting, restoring and rehabilitating aquatic habitats are critical to maintaining their integrity and sustaining ecosystems.²⁴

The Commission held hearings on DFO's habitat management mandate and on specific habitat management topics, including:

- implementation of DFO's Policy for Management of Fish Habitat;²⁵

Finally, I note that on June 29, 2012, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures* (Bill C-38), received royal assent. Bill C-38 amends the *Fisheries Act* and enacts a new *Canadian Environmental Assessment Act, 2012*, repealing the *Canadian Environmental Assessment Act* in force at the time of the hearings. I discuss Bill C-38 in Volume 3, Chapter 3, Legislative amendments.

■ Habitat management policies and practices

This section describes the evidence I heard on the policies and practices relevant to the management of Fraser River sockeye habitat. Although the hearings focused on the application of habitat management policies and practices in the Fraser River watershed – that is, the freshwater environment – most of the topics discussed are applicable to the marine environment as well.

DFO is the primary federal government department with responsibility for management of Fraser River sockeye habitat. Environment Canada is also involved. Other federal and provincial government agencies play a role, as do local governments. Those other agencies are described where necessary later in this chapter. For an overview of the legislative framework for Fraser River sockeye salmon see Chapter 3, Legal framework.

DFO Oceans, Habitat and Enhancement Branch

DFO Pacific Region's Oceans, Habitat and Enhancement Branch (OHEB)* has two complementary mandates:

- conserving, protecting, and restoring fish habitat to support sustainable recreational, Aboriginal, and commercial fisheries through the provision of scientific information and advice; and
- conserving and protecting oceans, ocean resources, and biodiversity on an ecosystem basis through integrated management, a precautionary approach, and sustainable development principles.²⁶

Within the Pacific Region, the regional director of OHEB functionally reports to two assistant deputy ministers at DFO's national headquarters in Ottawa (Ecosystems and Fisheries Management sector and Programs sector) and line reports to the Pacific regional director general (RDG). The six DFO area directors functionally report to the regional director of OHEB and line report to the RDG. OHEB managers at regional headquarters (e.g., director, Salmonid Enhancement Program) line report to the regional director of OHEB.²⁷

There are four major programs in OHEB: the Salmonid Enhancement Program (SEP), the Habitat Management Program, the Oceans Program, and the Species at Risk Program.²⁸ SEP and the Oceans Program are discussed later in this chapter. The other two programs are described below.

Habitat Management Program

Within DFO, the regulation and management of fish habitat fall under the Habitat Management Program.²⁹ It is responsible for regulatory reviews, watershed planning, partnership and collaboration, information management, and monitoring.³⁰ The primary focus of the Habitat Management Program's regulatory work derives from section 35

of the *Fisheries Act*. When a developer or proponent[†] submits a proposal to DFO for regulatory review under the Act, the process is termed a "referral."³¹

National headquarters provides the policy framework and tools that are used in the regions, such as the 1986 Habitat Policy (reproduced as Appendix C) and operational policies. It also provides advice to the regions on major project development and the implementation of policies. In the DFO organizational scheme in place at the time of the hearings, habitat is not the sole focus of any one sector in Ottawa. Habitat management responsibilities are shared primarily across two sectors. The policy aspects fall within the Programs sector, while the operational aspects fall within the Ecosystems and Fisheries Management sector.³² For an explanation of DFO's national sectors, see Chapter 4, DFO overview. Rebecca Reid, regional director of OHEB from 2007 to 2010, described the difference between national and regional responsibilities as one of policy development (national) versus policy implementation (regional).³³

Regional OHEB staff, who are located at the regional headquarters in Vancouver and the five area offices, carry out the day-to-day delivery of the Habitat Management Program. The Habitat Management Program has a few key sub-programs: the Habitat Management group, which has primary responsibility for responding to project referrals; the Habitat Monitoring group, which conducts compliance monitoring; and the Major Projects and Environmental Assessment group, which focuses on certain aspects of CEAA environmental assessment work.³⁴

Over the last five to 10 years, funding for the Habitat Management Program has essentially remained stable. However, the strategic review departmental cuts of 5 percent under way during this Inquiry will affect the Habitat Management Program budget.³⁵

Species at Risk Program

The Species at Risk Program applies the *Species at Risk Act* (SARA) to identify species that are at risk

* During the Commission, the name of OHEB was changed to Ecosystem Management Branch; however, OHEB is used throughout this Report. For further explanation of OHEB, see also PPR 14, Freshwater Urbanization, pp. 13–17, and PPR 11, Habitat Enhancement and Restoration, pp. 7–8; and Exhibit 654.

† "Proponent" and "developer" are used interchangeably, but DFO in general refers to proponents and I have followed that usage. Proponents may include private land developers, government bodies, and others.

or trending toward risk so that appropriate steps for protection or recovery may be developed and implemented. The program also develops goals, objectives, and approaches for recovery, as well as identifying appropriate measures and actions to achieve recovery.³⁶

OHEB delivers this program in conjunction with other sectors, such as Science, Fisheries and Aquaculture Management, and Conservation and Protection; area office involvement is indirect and occurs mostly through incorporating recovery strategy requirements into *Fisheries Act* referrals and various planning processes.³⁷ For more information on SARA and Fraser River sockeye, see Chapter 11, Cultus Lake.

Provincial-federal co-operation on habitat management

Many of the activities regulated by the province (e.g., agriculture, forestry, mining, road construction, waste management, water use, land use, and development) may affect Fraser River sockeye habitat (see also chapters 3, Legal framework, and 4, DFO overview). Accordingly, these activities may have to comply with both federal and provincial laws. The participant Canada told me that land and water use are largely managed by the province, though Canada has a role where fish habitat or navigable waters are involved.³⁸

Fish habitat management is about water and land use management. According to Jason Hwang, area manager, OHEB, BC Interior, DFO has a very specific authority and role under the *Fisheries Act* to manage, protect, and administer regulatory decisions around water and land use, and it does its “best with that to influence ... decisions in favour of fish.” He said that the department does not have a veto for everything that happens on land, as the authority for land and water use ultimately lies with the province.³⁹ DFO needs to work co-operatively with the other agencies to manage fish and water.⁴⁰ But, Mr. Hwang testified, there can be competing priorities, for example, where an agency has a mandate to manage forest harvesting and generate economic benefits for the province and DFO has a

mandate to protect fish habitat.⁴¹ For a discussion of provincial-federal co-operation on habitat enforcement, see Chapter 7, Enforcement.

The province assumed responsibility for the management of all freshwater fish species except anadromous salmon through a 1938 agreement with DFO.⁴² The federal government retained responsibility for fish habitat.⁴³

There have been a number of Canada-British Columbia administrative agreements for habitat management.* The 1997 Canada-British Columbia Agreement on the Management of Pacific Salmon Fishery Issues spawned two habitat-related sub-agreements: the 1999 Sub-Agreement Respecting Fisheries Information Coordination and Sharing, and the 2000 Canada-British Columbia Fish Habitat Management Agreement (2000 Canada-BC Agreement). The 2000 Canada-BC Agreement has two overarching commitments:

- to establish a federal-provincial habitat management committee at the director level (or equivalent); and
- to establish local habitat management committees, or use existing committees or frameworks, to develop a coordinated local approach to setting objectives for fish habitat protection, watershed and resource planning, and fish habitat referrals.⁴⁴

Currently, there is no active federal-provincial habitat management committee at the director level; however, according to DFO, the Pacific Fisheries and Aquaculture Committee, which is a working group of the Pacific Council of Fisheries and Aquaculture Ministers, is intended to play this role. There is no annual reporting on the status of implementation as set out in the agreement.⁴⁵

Other Canada-BC fisheries endeavours, most notably the Pacific Council of Fisheries and Aquaculture Ministers and its staff-level support committee, the Pacific Fisheries and Aquaculture Committee, have not formalized any co-operative processes or approaches to fish habitat management during the last 10 years.⁴⁶ A Canada-BC fish habitat management task group was formed in response to a commitment made by the Canadian

* See Exhibit 1923 (List of Treaties, Acts, Regulations, Agreements, Policies, Programs and Procedures Related to the Management of Fish and Fish Habitat on the Pacific Coast of Canada, submitted by DFO to the Commission, October 2010).

Council of Fisheries and Aquaculture Ministers. The 2009 terms of reference for this group state that the group will dissolve once a “fish habitat subcommittee” is established under either the 1997 Canada–British Columbia Agreement on the Management of Pacific Salmon Fishery Issues or the Pacific Council of Fisheries and Aquaculture Ministers / Pacific Fisheries and Aquaculture Committee process. As of spring 2011, the fish habitat subcommittee had not been formed.⁴⁷

In 2004, the Auditor General’s report noted concerns about the coordination between DFO and the province on the protection of fish habitat,⁴⁸ and in 2009, the Commissioner of the Environment and Sustainable Development (CESD) reported that accountability in agreements with the provinces is weak.⁴⁹ In response, DFO agreed to review and evaluate, by March 31, 2011, its memoranda of understanding with the provinces and territories.*

When asked about these concerns at the hearings, Mr. Hwang said that the BC Interior office does not see a lot of guidance coming from headquarters about how the Habitat Management Program and the province are to coordinate their work, despite the existence of the 2000 Canada–British Columbia Fish Habitat Management Agreement and other federal-provincial agreements. His understanding at the area level was that the 2000 Canada–BC Agreement has not progressed beyond directing habitat staff to establish some local co-operative committees. There are many examples at the operational level where DFO and provincial staff get along effectively on habitat matters, but there are also examples of things that fall through the cracks and do not get resolved as effectively as they could.⁵⁰

Ms. Reid said that, although existing broad, overarching agreements like the 2000 Canada–BC Agreement are good in concept, they are not put into operation as clearly as habitat staff would like.⁵¹

In monitoring habitat, Dave Carter, regional team leader, Habitat Monitoring Unit, OHEB, said he does not use the 2000 Canada–BC Agreement, although some of the principles in the agreement inform his work. He does not participate with the province on any habitat monitoring committees, although he does sometimes meet with provincial officials and there are a number of area-based ad

hoc committees looking at monitoring in which DFO habitat and provincial staff participate.⁵²

Key provincial legislation affecting fish habitat

In this section, I introduce the most important provincial acts and regulations affecting the management of fish habitat. For further discussion about the provincial laws relevant to Fraser River sockeye habitat management, see the sections of this chapter on freshwater habitat and contaminants as well as Chapter 3, Legal framework.

The *Fish Protection Act* provides that the Lieutenant Governor in Council may, by regulation, designate streams as sensitive when this designation will help protect a population of fish whose sustainability is at risk because of inadequate water flow within a stream or habitat degradation.⁵³ Designated sensitive streams in the Fraser River watershed include Kanaka Creek, Nathan Creek, Salmon River (near Prince George), Silverdale Creek, West Creek, and Whonnock Creek.⁵⁴ As of July 2011, no further streams had been designated. The *Fish Protection Act* also prevents the construction of new bank-to-bank dams on the Fraser River.⁵⁵ The *Riparian Areas Regulation* (RAR) developed under this Act, directs local governments to improve the protection of fish and fish habitat in British Columbia in riparian areas.⁵⁶

The provincial *Water Act* is the primary statute for managing works in and about a body of water and the diversion of water. It vests in the province the right to use and regulate flow of all stream water except where private rights have been established.⁵⁷ The *Water Regulation* sets out works permitted under the *Water Act*’s notification process, including restoration and maintenance of fish habitat, repair and maintenance of existing dikes, and emergency flood protection work.⁵⁸

The provincial government regulates the forest industry by granting licences to harvest timber, stipulating forestry practice requirements, and subsequently granting approval to licensees to carry out forestry activities. It exercises this authority mainly through the provincial *Forest and Range*

* For a list of co-operative and planning initiatives engaged in by the Pacific Region Habitat Management Program with the province and other agencies, see Exhibit 655.

*Practices Act*⁵⁹ (FRPA) and the *Forest Act*.^{*} The *Forest Planning and Practices Regulation* (FPPR) is the main regulation affecting fish habitat.⁶⁰

The *Environmental Management Act* (EMA) is the primary provincial legislation governing the disposal of waste into the environment. Section 6 prohibits a person from introducing waste or causing or allowing it to be introduced into the environment in the course of conducting a prescribed industry, trade, or business.⁶¹ Further, a person must not introduce waste into the environment so as to cause pollution. However, the EMA allows the disposition of waste, in compliance with the Act and a valid permit, approval, or order, regulation, or waste management plan.⁶² The *Waste Discharge Regulation* prescribes the industries, trades, businesses, operations, and activities that require some form of authorization before discharging waste into the environment under subsections 6(2) and (3) of the EMA, as well as those that are exempt from the regulation. The regulation also prescribes the industries, trades, business, operations, and activities that may be exempt from subsections 6(2) and (3) through compliance with an approved code of practice. Industries that introduce waste into the environment in accordance with a code of practice are exempt from subsections 6(2) and (3) of the EMA.⁶³ No site-specific permit or other waste discharge authorization is required. These exemptions include the discharge of domestic sewage to a sewerage system.⁶⁴ Wastewater treatment facilities are regulated under the *Municipal Sewage Regulation*, pursuant to the EMA.⁶⁵

1986 Habitat Policy for the management of fish habitat

The 1986 Habitat Policy guides DFO's administration of the *Fisheries Act* habitat protection provisions.⁶⁶ The policy sets out several key principles that guide the Habitat Management Program. It recognizes that fish habitat is the production system necessary to sustain Canada's fisheries resources. The 1986 Habitat Policy is a national policy and is also department-wide, meaning it contains guidance intended not only for DFO Habitat

Management Program staff, but also for department staff involved in science, enforcement, policy, and programs. It states that it provides "objective statements against which the Department can measure its performance in fish habitat management."⁶⁷

The ultimate objective of the 1986 Habitat Policy is to achieve a "net gain of the productive capacity of fish habitats." This objective is supported by three goals: (1) active conservation of the existing productive capacity of habitats; (2) restoration of damaged habitats; and (3) development of new habitats, as shown in Figure 1.6.1. The policy applies to all proposed development projects and activities of any size, in or near the water, that could "alter, disrupt or destroy" fish habitats, whether by chemical, physical, or biological means.⁶⁸

I heard evidence with respect to the 1986 Habitat Policy – and Fraser River sockeye habitat in particular – that spawning and rearing habitat, and all the migration routes, including the Fraser River estuary, are critically important to maintaining the productivity of Fraser River sockeye stocks.⁶⁹ Mr. Hwang told me that the 1986 Habitat Policy is tremendously valuable because it gives DFO and other entities, like the provincial Ministry of Environment, something to point to when looking at trade-offs between economic development and the impact on fish and fish habitat. It provides DFO a "very strong and powerful opportunity to bring the fisheries' interest to the table when those kinds of decisions or trade-offs are being considered."⁷⁰ Despite the concerns about implementation of the 1986 Habitat Policy (discussed below), it appears that salmon habitat, including that of Fraser River sockeye, is better off today than it would have been without this policy.⁷¹

The fish habitat conservation goal (Goal 1 in Figure 1.6.1) is the most fully articulated of the 1986 Habitat Policy's three goals. It seeks to "[m]aintain the current productive capacity of fish habitats supporting Canada's fisheries resources." In part, this maintenance is done by administering and enforcing the habitat provisions of the *Fisheries Act* to "control the negative impacts of existing and proposed projects and activities that have a potential to alter, disrupt and destroy habitats." The goal is guided by a principle of "no net loss of the

* The *Forest Act*, RSBC 1996, c. 157, grants the right to harvest timber in British Columbia and gives the Lieutenant Governor in Council the authority to make regulations to designate Crown land as mountain pine beetle salvage areas.

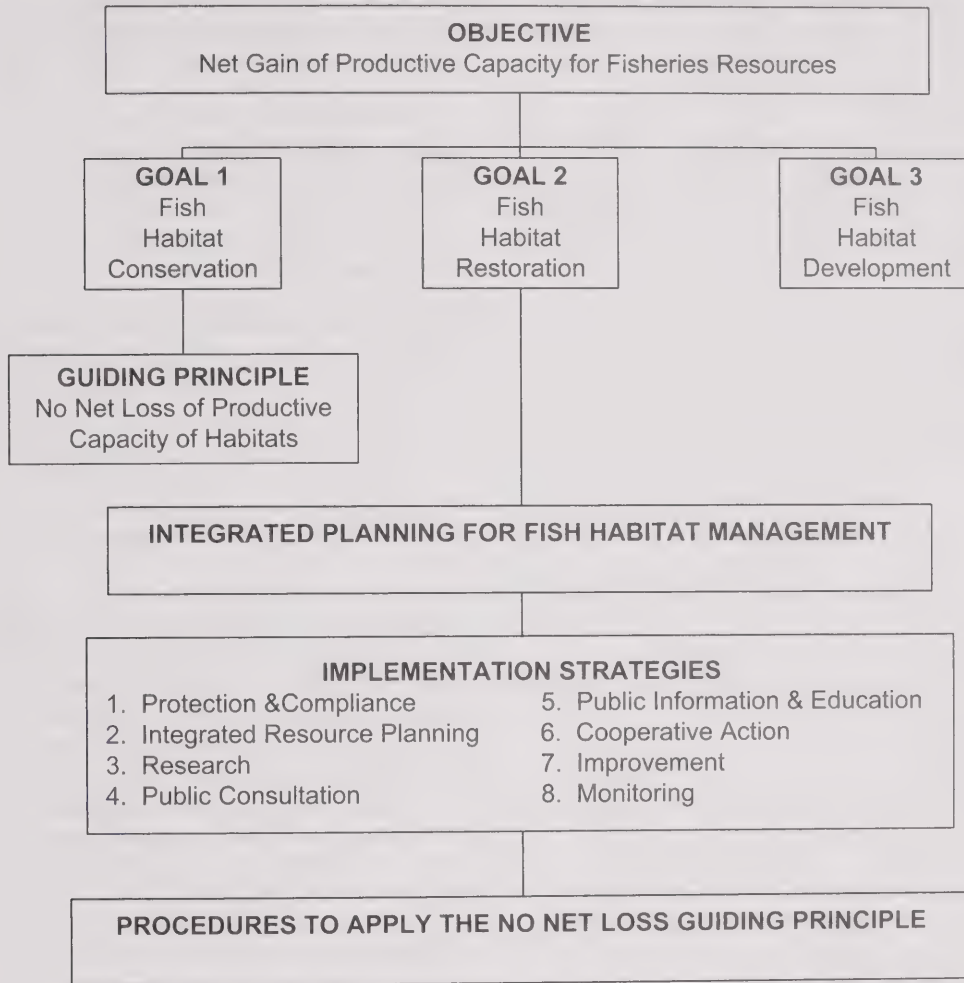


Figure 1.6.1 Policy Framework for Fish Habitat Management

Source: Reproduced from Exhibit 260, p. 12.

productive capacity of [fish] habitats" (No Net Loss principle). The No Net Loss principle is the policy's best-known feature although technically only applicable to the first goal.* Under this principle, the department strives to balance unavoidable habitat losses to development with habitat replacement on a project-by-project basis. This practice is known as habitat compensation. No Net Loss applies to both the deposit of deleterious substances (prohibited

under section 36 of the Act) and harm to habitat (prohibited under section 35 of the Act).⁷²

Although No Net Loss is paramount to the 1986 Habitat Policy's conservation goal, techniques used in relation to the two other goals – to restore habitat and to develop habitat – may also be employed by proponents to achieve No Net Loss and the conservation goal.⁷³ The second two goals are set out in the 1986 Habitat Policy as follows:

* Although No Net Loss is the guiding principle of goal 1, the phrase "to achieve No Net Loss" is regularly used as shorthand for the achievement of the 1986 Habitat Policy's conservation goal of maintaining the current productive capacity of fish habitat. I follow this usage in this Report.

- *fish habitat restoration* – rehabilitate the productive capacity of fish habitats in selected areas where economic or social benefits can be achieved through the fisheries resource; and
- *fish habitat development* – improve and create fish habitats in selected areas where the production of fisheries resources can be increased for the social or economic benefit of Canadians.⁷⁴

Whether DFO is meeting the policy's objective of net gain of productive capacity is discussed below.

The 1986 Habitat Policy describes eight strategies focused primarily on implementing the conservation goal, but which may also apply to the restoration and development goals.

1. Protection and compliance
2. Integrated resource planning
3. Scientific research
4. Public consultation
5. Public information and education
6. Cooperative action
7. Habitat improvement
8. Habitat monitoring⁷⁵

According to the 1986 Habitat Policy, applying No Net Loss does not mean that proposed development projects in or near water will end, or that unreasonable demands will be imposed on their designs. However, each project should be evaluated, early in the planning phase, using an existing process where possible, to determine if its impact on fish habitat would reduce the habitat's productive capacity.⁷⁶ Where a fishery resource and supporting habitat are put at risk by a proposed project or activity, DFO is to be guided by the following hierarchy of preferences to achieve no net loss of productive capacity:

- 1 Maintain without disruption the natural productive capacity of the habitat(s) in question by avoiding any loss or harmful alteration at the site of the proposed project or activity.
- 2 If it proves impossible or impractical to achieve the first preference, then explore compensatory options in the following order: (1) assess possibilities of like-for-like

compensation at or near the site; and (2) consider replacement of habitat off site or increase the productivity of existing habitat for the affected stock.

- 3 Where the first two preferences are not technically feasible, consider proposals to compensate through fish production.⁷⁷

The policy assumes a referral process whereby DFO receives information about or a request for review of proposed projects (see description of this process below). Referrals may come through established inter-agency referral systems, through inquiries from the proponent of a proposed project or from concerned citizens, through public announcement of a project, or through DFO's own requests.⁷⁸ However, as discussed below, the habitat referral process uses a risk management framework, and therefore many projects are not actually reviewed.

Although No Net Loss applies to harm prohibited by sections 35 and 36 of the Act, habitat compensation only applies to harm to physical habitat prohibited by section 35 of the Act.⁷⁹ Compensation is defined as "[t]he replacement of natural habitat, increase in the productivity of existing habitat, or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada's fisheries resources."⁸⁰ To provide operational guidance on compensation, the department published the *Practitioners Guide to Habitat Compensation* in 2006. The guide directs habitat staff to aim for a compensation ratio greater than one-to-one, meaning that the productive capacity of compensatory habitat should exceed the productive capacity of impacted habitat. The amount of compensation required is to be determined based on the residual net loss of the productive capacity after relocation, redesign, and mitigation have been taken into consideration. In situations where very high ratios are required, the guide suggests habitat staff should reconsider whether the proposed "harmful alteration, disruption or destruction of fish habitat" (HADD) prohibited under section 35 should be authorized.⁸¹

If the HADD authorization is conditional upon satisfactory compensation, failure to provide

adequate compensation may invalidate the authorization and leave the proponent vulnerable to enforcement action.⁸² Habitat Management Program staff may also demand financial security from the proponent.

A recently revised draft version of the *Practitioners Guide to Habitat Compensation* removes the compensation hierarchy on the basis that it is “too prescriptive and limits the ability to find innovative means to seek compensation.” The revised version also omits artificial propagation (the least preferred method of compensating for habitat losses in the original guide), which is “not sustainable in perpetuity.”⁸³

The 1986 Habitat Policy and the 2005 Wild Salmon Policy (WSP) (described in Chapter 10, Wild Salmon Policy) are distinct but complementary policies. The WSP says this about the 1986 Habitat Policy:

Identifying, protecting, restoring and rehabilitating aquatic habitats are critical to maintaining their integrity and sustaining ecosystems. Since 1986, DFO's Habitat Management Program has been guided by the “no net loss” principle for the protection of these habitats. The first and preferred approach is prevention of habitat loss. DFO policy also stipulates that where a harmful alteration of habitat is authorized by the Minister, losses shall be compensated by habitat replacement.

The strategies for achieving “no net loss” have focused primarily on project-by-project review, mainly in freshwater environments. A modern, more effective approach to achieve “no net loss” must assess the importance of habitat on an ecosystem basis, and balance the degree and type of impact with the most effective remedy. In evolving to a more integrated approach, the Department will make greater use of indicators to assess and monitor the health of freshwater and marine habitat.

A new focus on the salmon habitat that is most productive, limiting, or at risk in a CU [Conservation Unit] will clarify decision-making and better link habitat management strategies to harvest and salmon assessment (Strategy 4). Low risk activities, where measures to avoid or mitigate impacts are well understood, will be dealt with through other mechanisms such

as guidelines and standards. This approach will ensure that all habitats are addressed and resources are focused where most required.⁸⁴

Operationally, there are obvious overlaps between the 1986 Habitat Policy and strategies 2 and 3 of the WSP. I discuss this overlap further in the findings section below, as well as in Chapter 10, Wild Salmon Policy.

Implementing the 1986 Habitat Policy

Various participants in this Inquiry expressed concerns in their final submissions about DFO's efforts to implement the 1986 Habitat Policy. They told me there has been an ongoing loss of fish habitat rather than the net gain envisioned by the policy; DFO is not adequately monitoring habitat loss or enforcing proponent compliance; the policy is still not fully implemented; and the No Net Loss principle is either misapplied or not applied at all.⁸⁵

Two previous reports canvassed DFO's success in implementing the 1986 Habitat Policy:

- In 2004, the CESD found “indications” that implementation of the 1986 Habitat Policy “does not seem to be working.” The commissioner suggested the department “re-examine the objectives of the policy and make it work.”⁸⁶
- In 2009, the CESD examined DFO's protection of fish habitat generally. The commissioner reported that “[i]n the 23 years since the Habitat Policy was adopted, many parts of the Policy have been implemented only partially ... or not at all.” The report explained that, because the department “does not measure habitat loss or gain” and has limited information on the state of fish habitat, it cannot determine the extent to which it is progressing toward the Habitat Policy's long-term objective of a net gain in fish habitat, and “[t]here has been little progress since 2001.”⁸⁷

In response to the 2009 CESD report, DFO agreed to determine by March 2010 what actions are required to fully implement the 1986 Habitat Policy.⁸⁸ DFO completed its review of the 1986 Habitat Policy in 2010 and developed an action plan to renew

the policy (see discussion below).^{*} The review of the policy considered its eight implementation strategies but focused on Strategy 1 (protection and compliance).⁸⁹ In explaining his part in this review, David Bevan, associate deputy minister, said:

Now, we – “we” being myself and Kevin Stringer – met with habitat practitioners and managers across the country to discuss the policy and to discuss the implementation of the program. The difficulty we have is right now, the model for the delivery of the program is to receive proposals from proponents and then to review those to determine if there’s going to be a hazard or a change to the habitat, a HAD[D], and whether or not then there has to be an approval process initiated. That is very labour-intensive. It doesn’t look at the risks posed by these various projects and you end up trying to treat everything the same and it’s not an effective way. So what we’re looking at doing is bringing the ... practitioners of the program together over the course of the Fall to look at a new set of procedures and protocols for how to manage the risks that human activities pose in the habitat of fish and then how to be much more proactive and to spend more time on things like monitoring and then dealing with problems there and less time on low-risk activities where we’re looking at an armour stone or seawall or a wharf being put in where we think we can handle that through a different process.

So we’re looking at revising the program and to ensure that the policies reflect a better way ahead. The real problem we have with no net loss is the development of metrics. How much habitat exists? How do you track it over time? And that’s been a significant challenge. We still have that as a goal and we still have the policy in place but we do think that we need to look at the design of the program with a view to being more proactive, more focused on risk management and using better tools to get compliance with the policy and to make sure the policy reflects the actions.

That’s what we’re doing and we have that step done and we’re looking at now bringing the peo-

ple together over the course of the winter to try to be in position for the coming years to modify the approach and to get a better result for Canadians and for the preservation of fish habitat.⁹⁰

According to Patrice LeBlanc, director, Habitat Management Policy Branch, Program Policy sector, and Ms. Reid, in many cases DFO does implement all the strategies, although Mr. LeBlanc also stated that DFO is primarily focused on implementing Strategy 1 of the policy and that limited effort and resources are directed at implementing the other seven strategies.⁹¹ DFO has not estimated the level of effort it spends on each strategy and whether additional resources are needed to implement the policy.⁹²

Achieving No Net Loss

A number of previous reports have examined the issue of whether DFO is achieving No Net Loss as set out in the 1986 Habitat Policy:

- In 1997, the Auditor General examined the sustainability of the resource base for Pacific salmon. The report found that the department had not developed an acceptable, standardized measure of habitat productivity. Moreover, the Auditor General’s report suggested that an accumulation of small impacts from small-scale developments are probably the source of the “slow net loss” of habitat that is occurring.⁹³
- In 1999, the Auditor General observed that fish habitat loss was still occurring, contributing to the continuing decline of many salmon stocks.⁹⁴
- In 2004, the CESD reported on salmon habitat and found “indications that habitat loss is continuing.”⁹⁵

DFO has acknowledged these criticisms and its responses to them are contained within the above-noted reports. In 2000, DFO embarked on a national evaluation program to assess whether compensation is “achieving No Net Loss of fish habitat productivity.”⁹⁶ The program included four components, each reported in a paper published in a peer-reviewed journal. These components are summarized in Table 1.6.1.

* Exhibit 665 is a progress report regarding DFO’s response to the 2009 CESD report that was provided to the deputy minister in 2011 (Patrice LeBlanc, Transcript, April 5, 2011, p. 57).

Table 1.6.1 Summary of the four papers representing the four components of DFO's "national evaluation program"

Literature review	Located and reviewed studies from the peer-reviewed and "grey" literature that assessed habitat compensation projects. Found 10 studies containing 109 No Net Loss assessments of 103 compensation projects across Canada between 1992 and 2003. Most of the projects were in British Columbia and were either urban development- or forestry-related. Results: Over half the projects were determined to have had smaller compensation areas than HADD areas, and over one-third clearly did not achieve No Net Loss.
File review	Analyzed files for 124 HADD authorizations (105 from BC) from 1994 to 1997. Results: 25% had smaller compensation areas than HADDs. Determination of No Net Loss could only be made for 14% of authorizations because of poor compliance with monitoring requirements and because the performance criteria used by DFO did not assess effectiveness / No Net Loss.
Compliance audit	Conducted site visits for 52 of the 124 authorizations from the file review (selected randomly), to assess compliance with HADD area; compensation area; biological, physical, and chemical requirements in authorizations. Results: 86% of authorizations had larger HADD or smaller compensation than authorized, or both. Two-thirds resulted in net loss of habitat area.
Effectiveness study	Evaluated 16 of the 52 authorizations (7 in BC) for achievement of No Net Loss by comparing habitat productivity at project site and reference sites. Results: 63% of authorizations resulted in net losses of habitat productivity.

Source: Reproduced from Policy and Practice Report 8, Habitat Management, pp. 22-23, Table 2. The table was compiled from four papers written by David Harper and Jason Quigley. The literature review is Exhibit 736; the file review is Exhibit 667; the compliance audit is Exhibit 737; the effectiveness study is not an exhibit but was cited in PPR 8.

A summary of the challenges revealed by the four-part evaluation program was published in a fifth paper.⁹⁷ This paper includes 39 recommendations in three areas: (1) achieving No Net Loss; (2) measuring No Net Loss; and (3) improving organizational memory, learning, and transparency.

According to Mr. LeBlanc, DFO has done little since the work described in Table 1.6.1 to assess whether there has been an improvement in meeting the No Net Loss principle to implement the 1986 Habitat Policy's first goal of conserving fish habitat.⁹⁸ One change, however, is that DFO now has a habitat monitoring unit in each region (see the discussion below) and the Habitat Management Program is working with DFO Science to develop a standard, scientifically sound methodology to evaluate the accuracy of predicted HADDs and verify the effectiveness of the compensation measures (see below).⁹⁹ When asked whether Canada is currently achieving No Net Loss, Mr. LeBlanc testified that it is not achieving it and, furthermore, that there is an inability to measure the losses occurring nationally. He also said that, for some individual projects, No Net Loss may be

achieved.¹⁰⁰ If, however, action is not taken to arrest the effects of increasing economic development, the loss of fish habitat will continue, according to Mr. LeBlanc.¹⁰¹

Mr. Hwang said that, at the operational level, all indications are that Canada is not meeting the No Net Loss principle. He did say, however, that Fraser River sockeye habitat in the BC interior is probably better off than habitat for some other species because of the biology of the species and where it lives. He distinguished between proposed projects that come to DFO for review, which in his view are handled appropriately under the 1986 Habitat Policy, and the many other projects that are not reviewed by DFO for a variety of reasons and that have a cumulative incremental effect on habitat loss. One challenge in achieving No Net Loss for Fraser River sockeye is development in the Shuswap Lake area, where there are historical pressures from land uses such as agriculture and forestry; there are linear developments from railways, hydro rights-of-way, and highways; and, more recently, there has been a significant increase in recreational and residential property

development, all of which are “not positive for fish and fish habitat.”¹⁰²

Ms. Reid agreed that Canada is probably not achieving No Net Loss, but said that there is not enough information to be sure.¹⁰³

Mr. Nelson said that, based on his experience working on the Fraser River for 20 years and through staff who continue to work on the Fraser, there has probably been a loss of fish habitat in many areas.¹⁰⁴ Paul Steele, former national director general of Conservation and Protection, said that his direct knowledge of the situation on the Fraser River is quite limited but that, from what he has heard, he generally agreed with Mr. Nelson’s view of the loss of fish habitat on the Fraser.¹⁰⁵

Claire Dansereau, deputy minister, DFO, testified that the department is continuing to monitor whether No Net Loss is “working” and that in some cases it is working and in some cases it is not.¹⁰⁶ In her view, the No Net Loss principle is a “guiding principle, as opposed to necessarily a metric that was ever intended to be measured on a centimetre-by-centimetre [basis] for habitat.”¹⁰⁷ She went on to say:

I would say that we have areas that we can certainly improve on, but I don’t think that the intention was ever that it would be that categorical. We are, as I think you know, looking at how to improve the system by taking the principle of no net loss potentially to an ecosystem base, rather than a project-by-project base, to allow us to achieve the intended outcomes, which is to make sure that the fish have the habitat that they need in order to survive and to thrive.¹⁰⁸

Ms. Dansereau said that, whether the specifics of No Net Loss have been met on a case-by-case basis, “I don’t think we can say, and I don’t think we would say.”¹⁰⁹ However, Ms. Dansereau said DFO still takes the approach that, on a project-by-project basis, there must be habitat created or compensated for in some way for every area of habitat lost, although DFO is not as “proficient” at going back and monitoring to ensure that this has occurred for each project authorized by DFO. She said that this is particularly true for smaller projects.¹¹⁰

Mr. LeBlanc also said that No Net Loss was never intended to be a “performance measure” but that it was intended to be a “guiding principle”

that would allow DFO to make decisions about HADDs.¹¹¹ And I heard from Mr. Carter that the No Net Loss principle is more of a goal than a performance measure.¹¹² In contrast, the policy itself says that it provides “objective statements against which the Department can measure its performance in fish habitat management.”¹¹³

Measuring No Net Loss

In 1997, the Auditor General found that DFO had not developed a measure of fish habitat productivity.¹¹⁴ In 2009, the CESD found that DFO does not measure habitat loss or gain, and it recommended DFO develop habitat indicators.¹¹⁵ When asked about this situation, Mr. LeBlanc said that DFO has no indication whether it is gaining or losing habitat.¹¹⁶ He added that, although DFO has no real way to assess whether it is achieving no net loss of productive capacity, it is hoping to develop indicators to allow it to do this assessment.¹¹⁷

Mr. LeBlanc said there is a need for rigorous national scientific methodology to measure whether the No Net Loss principle has been met, including verifying that a HADD has occurred, and measuring the effectiveness of compensation. In his view, the results of the monitoring programs should be peer reviewed through the DFO Canadian Science Advisory Secretariat (see discussion in Chapter 4, DFO overview) or some other mechanism.¹¹⁸

Mr. Hwang and Mr. LeBlanc both said that DFO does not yet have the ability, on a site-specific, operational basis, to measure habitat productivity.¹¹⁹ DFO Science has been asked to develop indicators for fish habitat in order to allow the department to measure whether there has been loss of productive capacity.¹²⁰ Mr. Hwang told me that establishing a benchmark, baseline, or status of habitat would allow a determination as to whether habitat is better or worse off. In his view, the habitat indicator work that has been started under the WSP is useful and, if completed, would be very helpful in managing habitat impacts now and in the future.¹²¹ According to Ms. Reid and Mr. Carter, the Pacific Region has developed the methodology for habitat indicators under the WSP (Strategy 2).¹²² Initial habitat status reports are at a preliminary stage (for further discussion, see Chapter 10, Wild Salmon Policy).¹²³

Cumulative impacts and No Net Loss

The 1986 Habitat Policy recognizes that cumulative impacts on habitat are a serious concern.¹²⁴ DFO habitat witnesses spoke about cumulative impacts and how these affect fish habitat.¹²⁵

Mr. Hwang testified that, although not every small project will negatively affect fish habitat, a greater number of small projects increases the probability of harmful effects. In his view, the trend of “slow net loss” of habitat due to an accumulation of small impacts from small-scale developments is still occurring, and DFO is aware of this fact and is doing what it can about it with the resources it has.¹²⁶ Mr. LeBlanc said that DFO lacks methodologies for assessing cumulative impacts.¹²⁷

I heard from Mr. Hwang about the challenge of managing cumulative impacts to fish and fish habitat:

Well, the challenge there, and I think it's spoken to largely in the previous Auditor General reports that were mentioned earlier, is that the effects to fish and fish habitat that have happened already are already there on the land base and they have already taken whatever measure of, I guess, reduced productive capacity out of the resource base. And what happens when something new comes along is that if that does have another negative effect, it adds up cumulatively. And that's what the previous audits have found and that's what continues on today.

So it creates a challenge whereby any single development proponent in their mind, when they look at their project in isolation, it seems reasonable an effect that they are proposing may not be particularly significant or large and they will propose that it be reasonable that they be allowed to proceed with that development. And Fisheries and Oceans, we find ourselves often trying to represent the interests of fish, both in the specific circumstances of that site, as well as over time in terms of the cumulative results of other development activities in that area.¹²⁸

Similarly, Michael Crowe, section head, Habitat Management Program, OHEB, BC Interior, said there is a need for management of cumulative incremental harm to sockeye habitat.¹²⁹ Mr. Bevan

said that no one at DFO is looking at the cumulative impact of habitat loss because the 1986 Habitat Policy calls for consideration on a project-by-project basis. He added that to develop this capacity DFO needs to shift some of its resources into monitoring.¹³⁰

Renewal of the 1986 Habitat Policy

In recent years, DFO internal discussion has turned to renewing or modernizing the 1986 Habitat Policy. According to Mr. LeBlanc, DFO has done some policy research and briefed the minister, but the department has not decided to do further consultation. If the proposal for renewal of the policy goes forward, a discussion paper would be presented internally and externally to get feedback on potential improvements to the policy and, once this discussion paper process is complete, then DFO would draft a new version of the policy, conduct internal and external consultation on this draft, and then finalize it. Mr. LeBlanc testified that it would take about a year to complete this entire process including obtaining ministerial approval and releasing the policy. In addition to internal discussions that have taken place, provincial and territorial officials at the director level and fisheries ministers were briefed on modernization of the 1986 Habitat Policy in 2008.¹³¹

DFO witnesses were asked what should be changed or retained in a revised habitat policy. All agreed that the policy should or could be updated, but they also said that the No Net Loss principle must be retained.¹³² Mr. LeBlanc felt that a revised policy should reference legislation introduced since 1986, such as the *Canadian Environmental Assessment Act* and the *Species at Risk Act*, as well as the duty to consult Aboriginal peoples. The ideas of an ecosystem-based approach and results-based regulation should also be included in the policy where DFO would “move away from individual, although not eliminate” project review. Mr. LeBlanc also mentioned the possibility of identifying priority habitats. He described the 1986 Habitat Policy as a “framework policy” that needs a set of other principles setting out who (such as provinces, territories, conservation groups, or industry) is best placed to deliver some of the functions that have to be carried out. This set of principles would include a principle of accountability and mechanisms to

audit for accountability. Finally, he testified that, since 1986, a series of operational policies has been developed that “hang from” the 1986 Habitat Policy, and therefore the policy should be aligned with these.¹³³

Mr. Hwang said that the hierarchy of preferences for achieving No Net Loss in the 1986 Habitat Policy are at times restrictive and can result in a compensation option that is not necessarily as useful as other measures. He suggested that a change to the 1986 Habitat Policy to allow Habitat Management Program staff the discretion to choose the most effective offset would be useful. However, he cautioned that a revised 1986 Habitat Policy should not “lower the bar for habitat protection” because “a strong policy is very, very helpful in terms of trying to carry that forward operationally.”¹³⁴

Ms. Reid spoke to the need for more operational direction in the policy about how decisions should be made on mitigation or compensation measures and how to balance conservation and economics. She also suggested that strengthening the partnership aspects, whether with local or provincial governments or First Nations, would be helpful.¹³⁵

I also heard from Susan Farlinger, regional director general, Pacific Region, that part of the renewal of the 1986 Habitat Policy is about figuring out how to measure and report back on implementation and demonstrate that DFO is protecting habitat.¹³⁶ She did not explain how this would be done in a renewed version of the policy.

In response to the 2009 CESD report, DFO committed to determine by March 2010 what actions were required to fully implement the 1986 Habitat Policy.¹³⁷ When asked in September 2011 why this determination has still not been made, Ms. Dansereau testified that it is a big task and it was overly optimistic for DFO to think that it could have been done by 2010. She said that by “this time next year” DFO hopes to have a “new Habitat Policy.”¹³⁸ I note that the Commissioner of Environment and Sustainable Development did not recommend DFO revise its Habitat Policy.

The Habitat Management Program referral process

Once DFO receives a proposed project (or “habitat referral”) it assesses the project information and, if necessary, visits the site.¹³⁹ DFO decides whether the proposed project is likely to result in a net loss of productive habitat capacity and may decide to:

- 1 permit the proposal to proceed as proposed (no harm expected to fish habitat);
- 2 reject the proposal (potential harm to fish habitat judged unacceptable); or
- 3 permit the proposal to proceed with conditions aimed at achieving No Net Loss. Conditions may relate to either mitigation (actions taken during planning, construction and operation stages to alleviate potential adverse effects on the productive capacity of fish habitats) or to compensation.¹⁴⁰

DFO has characterized its regulatory role as providing either advice or *Fisheries Act* section 35 authorizations, which may allow the HADD that a proposed project will cause.* DFO’s Habitat Management Program is largely focused on ensuring compliance with the prohibition against HADDs in subsection 35(1) of the Act and other statutory provisions.¹⁴¹ Under the *Fisheries Act*, development proponents are not required to seek advice, authorization, or approval from DFO for their proposed projects, but they are prohibited from conducting work that causes a HADD without authorization from DFO. Therefore, if they do not receive DFO approval they run the risk of prosecution under section 35.¹⁴² I note that, at the time of the hearings, under the CEEA a proposed project may require an environmental assessment by DFO before it can proceed, and this is discussed further below. In practice, many projects cannot proceed without harming fish habitat. Consequently, since 1986, DFO has authorized many harmful impacts to fish habitat on the permit condition that proponents create or improve other habitat to compensate for loss in habitat productivity.¹⁴³

* On June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 5, amends the *Fisheries Act* in a way that will likely change the way DFO manages fish habitat. In Volume 3, Chapter 3, Legislative amendments, I address the potential implications of the legislative changes in light of the evidence, findings, and recommendations arising from the Commission’s hearings.

DFO uses a “risk management approach” to determine whether a HADD is likely to result from a project, and to determine the extent of DFO’s regulatory engagement (see below). This approach is guided by the *Practitioners Guide to the Risk Management Framework* (Risk Management Framework), as well as a set of standard operating policies.

Most of the policies that guide the Habitat Management Program’s regulatory work are encapsulated in the Habitat Management Program’s Standard Operating Policies Manual (Manual). The Manual is a reference guide to direct DFO Habitat Management Program staff on the day-to-day delivery of DFO’s responsibilities under the habitat protection provisions of the *Fisheries Act*, CEEA, and SARA.¹⁴⁴ It contains policies of uniform national application, but DFO regional offices may supplement the national standard operating policies with policies specific to the region.¹⁴⁵ The Manual is a “living document” that DFO Habitat Management Program staff are responsible for updating when new or revised policies become available.¹⁴⁶

Risk Management Framework

The *Practitioners Guide to the Risk Management Framework* is used by staff reviewing habitat referrals. It has three components: aquatic effects assessment, risk assessment, and risk management.¹⁴⁷ These components each comprise a series of discrete steps in the overall process by which staff are directed to review development proposals. Before applying the Risk Management Framework, OHEB staff must do the following:

- check if an operational statement (discussed below) can be applied and, if there is an applicable one, then no further assessment is required;
- ensure that there is sufficient information to determine whether the habitat protection provisions of the *Fisheries Act* apply; and
- ensure that there is fish habitat within the area of the development proposal.

The first stage of the Risk Management Framework is an aquatic effects assessment. Aquatic effects assessment is a means of identifying the potential effects on fish and fish habitat from a proposed project. The second stage of the

Risk Management Framework is risk assessment. Risk assessment involves determining the scale of negative effect and the sensitivity of fish and fish habitat, and using this information to characterize the level of risk the development proposal poses to the productive capacity of fish habitat.¹⁴⁸

Habitat Management Program staff then use the analyses to plot a point on the Risk Assessment Matrix. The matrix is divided into four categories: low risk, medium risk, high risk, and significant negative effects. Figure 1.6.2 shows two points, representing hypothetical proposed projects, plotted on the Risk Assessment Matrix. Uncertainty is taken into account by changing the circle into an oval.¹⁴⁹

The final stage of the Risk Management Framework involves determining how best to manage the risk identified by stages 1 and 2. The two most common risk management tools are: (1) letters advising proponents of their obligations to protect fish habitat and of the means to do so (generally for projects deemed “low risk”), and (2) *Fisheries Act* authorizations that include conditions for monitoring, compensation, and possibly even providing financial security.¹⁵⁰

Authorizations are statutory approvals issued pursuant to subsection 35(2) that permit otherwise prohibited impacts to fish and fish habitat. They give the proponent protection from prosecution pursuant to section 32 and subsection 35(1), provided the proponent complies with the conditions of the authorization.¹⁵¹ For project proposals deemed “high risk,” the Risk Management Framework states that a site-specific review and authorization under subsection 35(2) are required. However, instead of a formal section 35 authorization, for projects deemed “medium risk,” a standardized authorization process is recommended.¹⁵² The Risk Management Framework suggests that these works are usually routine in nature, with small-scale or temporary effects. If a project falls in this medium-risk category and a streamlined authorization process has not been established, then a site-specific authorization would be required.¹⁵³

Proposed developments with significant negative effects are those in which the residual effects are so large and/or the fish or fish habitat is of such importance that it cannot be compensated adequately. In this case, Habitat Management Program staff are directed to issue a letter advising that the project will result in an unacceptable HADD; the letter

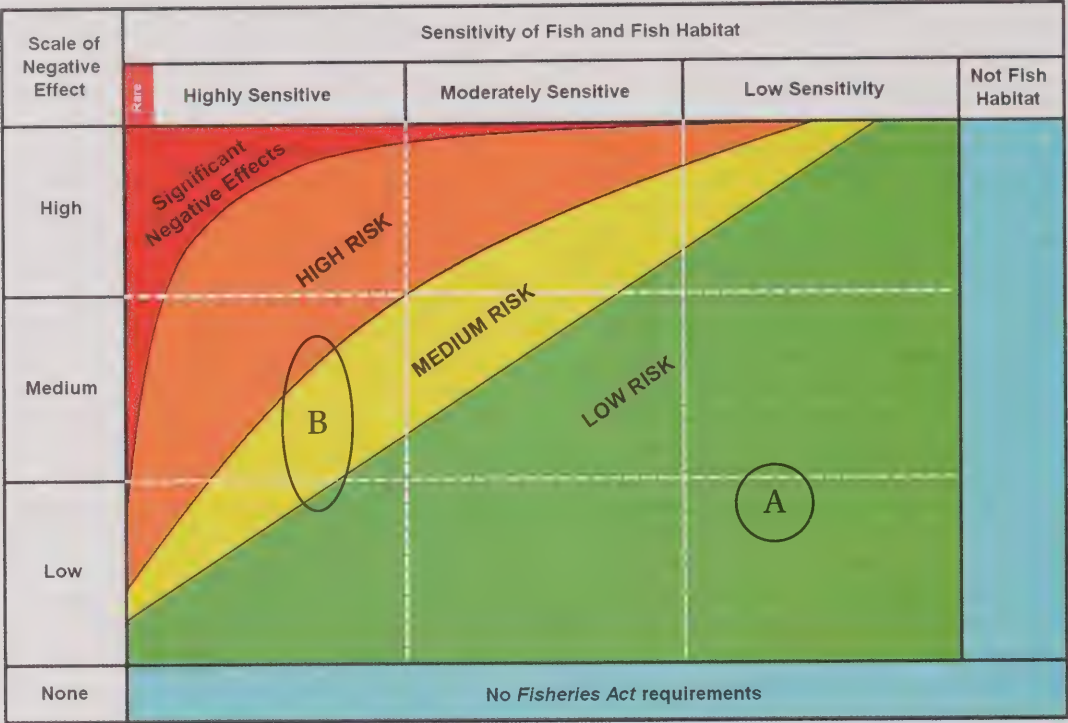


Figure 1.6.2 Risk Assessment Matrix with two plotted points representing two different proposed projects

Source: Policy and Practice Report 8, Habitat Management, p. 36, reproduced from Exhibit 1624, p. 18.

outlines the rationale for this conclusion. A proposal in this category will likely be considered a “major project” by the Habitat Management Program; as such, it would be managed by the regional manager, Environmental Assessments and Major Projects, with guidance from national headquarters.¹⁵⁴

Pacific Region referral management and prioritization

The Pacific Region has developed a Regional Habitat Regulatory Decision Framework (Regional Regulatory Framework). The region characterizes it as “complementary to, and consistent with” the national Risk Management Framework.¹⁵⁵ It is intended to further categorize and prioritize development proposals submitted for regulatory review.¹⁵⁶ It does not address major projects, which are managed by environmental assessments and major projects staff, as discussed below.

DFO’s national Habitat Management webpage “Working Near Water” and its Pacific Region counterpart “Working Near Water in BC and Yukon” guide proponents through the habitat referral process.¹⁵⁷ An overview diagram from the Pacific webpage is provided in Figure 1.6.3.

Non-reviewable projects, according to the Regional Regulatory Framework, are those that are considered low risk or for which mitigation measures, if complied with, would prevent a HADD. These include activities covered by operational statements (see below), as well as various works and projects the Regional Regulatory Framework considers low risk. There are also a number of “optionally reviewable” projects which cover activities for which there are best management practices (see below).¹⁵⁸

The Regional Regulatory Framework lists three additional categories of proposed projects that do not require DFO review:

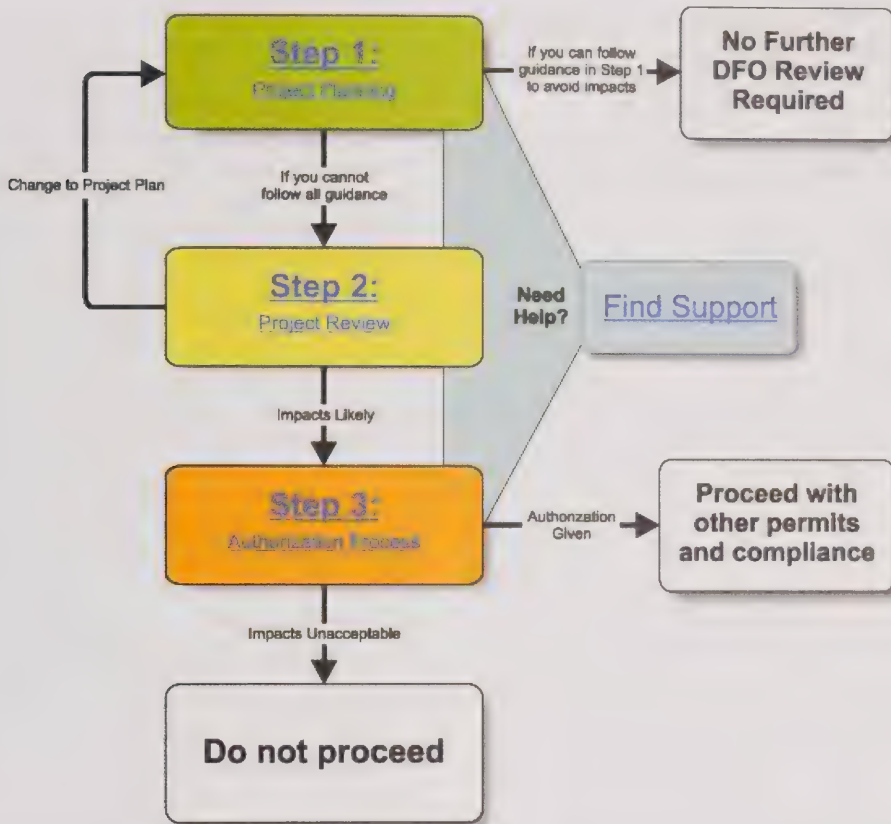


Figure 1.6.3 An overview of the project review process in the Pacific Region

Source: Policy and Practice Report 8, Habitat Management, p. 43, citing DFO Pacific website <http://www.pac.dfo-mpo.gc.ca/habitat/know-savoir-eng.htm>.

- 1 projects another level of government or agency has agreed to review and to which it will apply mitigation measures acceptable to DFO;
- 2 projects for which DFO has an agreement or arrangement with a specific industry sector, Crown corporation, or other partner to apply an “approved work practice” acceptable to DFO, monitor compliance, and report; and
- 3 projects for which measures acceptable to DFO for protection of fish habitat have been incorporated into a water, land, estuary, or foreshore management plan and will become conditions of a regulatory permit, licence, order, lease, approval, or operational protocol applied by a partner agency or Crown corporation.¹⁵⁹

The Regional Regulatory Framework directs Habitat Management Program staff to process referrals in order of priority. Only first and second priority proposals *must* be reviewed. The first priorities for review are emergencies that represent immediate threats to fish and fish habitat, and established Government of Canada priorities. Government of Canada priorities are federally funded infrastructure projects.¹⁶⁰ Priorities two through four are based on scores determined by four project prioritization criteria:

- 1 relative risk, which is based on the risk assessment attributes of the national Risk Management Framework (effect severity and habitat / species sensitivity);
- 2 obligatory reviews and time sensitivity;

- 3 species or area conservation concerns, including those arising from the Departmental Salmon Stock Outlook, Marine Protected Areas, and SARA; and
- 4 regional and area priorities, which may include particular industries or activities.¹⁶¹

Operational statements and best management practices

Many low-risk projects are never considered under the Risk Assessment Matrix (see above, including Figure 1.6.2) because DFO has implemented a number of activity-specific operational statements intended for low-risk projects, which outline conditions and measures for avoiding impacts on fish habitat. Each operational statement is specific to a type of development project or work, such as clear-span bridges, small moorings, or aquatic vegetation removal in lakes. Operational statements tell proponents that, if they follow the specified procedures for a specific activity, DFO will deem proponents as not causing a HADD. A proponent who complies with an operational statement does not have to submit a proposal for review by DFO, and no notice of the activities is required. However, proponents are encouraged to notify DFO. In the Pacific Region, notification is not considered a referral unless the proponent advises it cannot comply with the mitigation measures found in the guidance tools.¹⁶²

Although there is a national set of operational statements, not all apply in all regions. Each region is able to add, delete, or modify operational statements through an administrative process.¹⁶³ Proponents can also avoid DFO review by following other guidelines. Best management practice documents provide guidance on how best to conduct specific activities in a manner that meets DFO program objectives; many are produced by the province, some are co-authored by DFO and the province, and some are borrowed from other jurisdictions.* DFO provides best management practices to proponents of specific development activities and tells them to contact DFO if they cannot follow the best management practices.¹⁶⁴ If the proponent can follow the guidelines and avoid harm to fish and fish habitat, DFO does not review the project.¹⁶⁵

Environmental Process Modernization Plan

In 2004, the department initiated the Environmental Process Modernization Plan (EPMP).¹⁶⁶ The EPMP was launched to align delivery of Habitat Management Program responsibilities with government-wide priorities such as expenditure review, smart regulation, sustainable development, and ministerial and departmental priorities such as the Departmental Assessment and Alignment Project. It also responded to demands: by industry for greater certainty, clarity, consistency, predictability, and timeliness in regulatory reviews and environmental assessments; by provinces and territories for improved coordination with their regulatory and environmental assessment process; by environmental and conservation groups demanding stricter application of the *Fisheries Act* and SARA and broader application of the CEAA; and by Aboriginals and stakeholders for greater involvement in regulatory decisions and environmental assessments.¹⁶⁷ Mr. LeBlanc described it as an improvement initiative:

EPMP was one of several continuous improvement initiatives that we undertook to make the [Habitat Management] program more effective, more transparent, predictable, timely and coherent in the decision-making process, and also to engage others in terms of delivery of the protection of fish habitat.¹⁶⁸

The EPMP initially comprised five elements:

- 1 a Risk Management Framework (described above);
- 2 streamlined regulatory reviews of low-risk activities (i.e., referrals; described above);
- 3 improved coherence and predictability;
- 4 improved management of environmental assessments and major projects (described below); and
- 5 strengthened partnering arrangements.¹⁶⁹

In late 2005, a sixth element was added – Habitat Compliance Modernization.¹⁷⁰ Although many of the intended elements of EPMP have now been

* For an example of a best management practice, see Exhibit 1002.

implemented, some – such as Habitat Compliance Modernization – are not yet fully in place.¹⁷¹

The focus of the second element, streamlining regulatory reviews, was the development of operational statements. A key component of the third element was the development of a Standard Operating Policies Manual, originally released in May 2006. Other strategies to improve coherence and predictability included the development of a mandatory training program for all Habitat Management Program staff and changes to the program's governance structure.¹⁷²

The fourth element sought to bring a new approach to environmental assessments and the review of major projects. Resources were allocated to dedicated national and regional units that would focus on environmental assessments of major projects, and policies were established related to DFO's duties under the CEAA. Under this element, senior management became more involved in decision making with respect to both *Fisheries Act* and CEAA decisions for major projects (see below).¹⁷³

The strengthening of partnerships element sought to engage aggregate industry groups, non-government organizations, First Nations, and provincial and local governments in habitat protection.¹⁷⁴

The sixth and final element of EPMP, Habitat Compliance Modernization, aimed to build a nationally coherent, strategic, balanced, risk-based, and integrated approach to promote, assist, and compel compliance with habitat protection provisions of the Act. It also aimed to clarify the roles, responsibilities, and accountabilities of both the Habitat Management Program and the Conservation and Protection Program regarding habitat compliance activities and decisions through the implementation of a National Habitat Compliance Protocol and annexes (this protocol is also discussed in Chapter 7, Enforcement). Finally, Habitat Compliance Modernization was intended to enable the Habitat Management Program to monitor for compliance with, and effectiveness of, approved measures to mitigate impacts on fish and fish habitat and compensate for loss of fish habitat, as well as allow DFO to confirm compliance with the habitat protection provisions of the Act.¹⁷⁵

About the same time as the EPMP was introduced, resources for the Habitat Management Program were reduced. In June 2005, DFO

announced it would cut 42 Habitat Management Program positions, including 10 positions in the Pacific Region.¹⁷⁶ According to Mr. Crowe, this reduction was due to the Expenditure Review Committee process, EPMP, and the loss of B-based funding from “sunset” programs like the Habitat Conservation and Stewardship Program (see section below on habitat enhancement and restoration for more about this program).¹⁷⁷ In the BC Interior office, for example, 20 full-time equivalent habitat staff were reduced to eight.¹⁷⁸ However, according to Mr. Hwang, an expansion period between 1999 and 2005 saw quite a few staff added to the Habitat Management Program, which was followed by the staff cuts beginning in 2005. Thus, the numbers of BC Interior OHEB Habitat Management Program staff are now roughly the same as when Mr. Hwang first started with DFO in the BC Interior office in 1999.¹⁷⁹

Effect of budget reductions and streamlining processes on the Habitat Management Program in the BC Interior and Lower Fraser areas

In the 2000s, the province indicated to DFO's Habitat Management Program that it would no longer be actively reviewing individual proposed projects and would instead be moving to a “results-based approach,” which provides standards and guidance documents and has no active involvement in project review or environmental review committees. (Environmental review committees were DFO partnerships with local governments, often with provincial involvement, which would coordinate reviews and comments on proposed development projects.) According to DFO habitat managers, the initial impact on the department in the BC Interior and Lower Fraser was an increase in referrals; in response, DFO put in place streamlining measures so that proponents could “avoid impacts and therefore avoid the need for us to review their work.”¹⁸⁰

When the EPMP was introduced in 2004, Habitat Management Program staff in the Pacific Region expressed concern over specific aspects of the plan.¹⁸¹ A Pacific Region internal review or “diagnostic” observed in 2007 that Pacific Region Habitat Management Program staff felt that DFO was allowing significant habitat loss under the EPMP and not serving Canadians as it should.¹⁸² Barriers to staff's acceptance of the EPMP included

a lack of success indicators, not seeing the benefits or values of the EPMP, conflicts with personal values, and a perception that the EPMP was lowering the bar for habitat protection.¹⁸³ Ms. Reid spoke about the results of this review and said that, although some valid concerns were raised by staff, the various elements of EPMP are now successfully implemented in the region and the level of staff concern has gone down significantly.¹⁸⁴

A July 2007 internal DFO memorandum written by Mr. Hwang describes a number of key issues for the BC Interior Habitat Management Program staff at that time.¹⁸⁵ The memo indicates that the EPMP and staff reductions had reduced BC Interior staff's ability to engage with proponents of proposed projects; had resulted in a "regulatory minimum," which was not as favourable for fish habitat as under the previous regime; and meant that staff did not have a handle on what was going on with projects. Mr. Hwang confirmed that the latter issue still exists.¹⁸⁶ Two other DFO habitat managers, Mr. Crowe and Corino Salomi, area manager, OHEB, Lower Fraser, said that this memo for the most part reflected their views at this time.¹⁸⁷

A January 2007 internal DFO memo written by Mr. Crowe summarizes the changes and challenges for Habitat Management Program staff in the BC Interior office as a result of staff reductions. Mr. Crowe testified that, with the exception of a couple of changes for the better, such as DFO involvement in a local government foreshore planning initiative (Shuswap Lake Integrated Planning Process, see section below on freshwater habitat) and the province re-engaging in HADD management in resident fish-bearing waters, the situation in the BC Interior office is still substantively the same as set out in this memo.¹⁸⁸

Mr. Crowe and Mr. Salomi told me that changes in staffing and the implementation of the EPMP have resulted in a greater reliance by Habitat Management Program staff on streamlining processes such as provincial best management practices and federal operational statements. Also, the BC Interior office developed operational principles to determine the resources required to deliver on program priorities and triage the workload. In the Lower Fraser area, DFO encouraged local governments to adopt similar standards to the 1992 Land Development Guidelines within their bylaws, which a number of municipalities did. Further, DFO

participates in project review and assessment with the provincial and regional governments as part of the Fraser River Estuary Management Program.¹⁸⁹

Under the EPMP and DFO's Risk Management Framework, the department reviews fewer projects than it did prior to the EPMP.¹⁹⁰ I heard DFO witnesses say that one result of the EPMP's streamlining and voluntary reporting regime has been the screening out of a number of small projects from DFO's review process.¹⁹¹ But Mr. Hwang did not agree with the proposition put to him that the "vast majority" of small projects are not assessed by DFO.¹⁹² He also said that some guidelines and best practices were in place before the introduction of the EPMP, and that the EPMP put these into a national context, took a few more activities off DFO's plate, and created a situation in which DFO does not have a regulatory awareness of these activities anymore.¹⁹³

One concern with the EPMP is that projects framed as "low risk" may result in small but cumulatively significant habitat impacts. Removing these projects from DFO review means less opportunity for DFO to influence them in a way that would be positive for fish and fish habitat.¹⁹⁴ Mr. Hwang was asked whether there is an inconsistency between the EPMP's focus on medium- to high-risk projects and a concern about cumulative impacts. He answered that he would not necessarily frame it as an inconsistency because the rationale for a risk management approach is tied directly to the most effective use of the resources that you have at your disposal. If you have fixed resources and you only go after smaller projects, Mr. Hwang explained, then you are making a trade-off against reviewing the more significant or substantive things. The cost of having fixed resources is that the smaller, lower-risk projects are not getting the degree of oversight or scrutiny that a government could apply.¹⁹⁵

Ms. Reid commented that DFO cannot "do it all" and so the EPMP, the 1986 Habitat Policy, and other strategies that are in place reflect DFO allocating time and energy given its resources. According to her, in the Pacific Region, DFO made an explicit decision to not spend all of its time and energy on the project review process, but to focus also on stewardship and partnership; she noted that watershed planning is an important element of protecting habitat and addressing cumulative impacts.¹⁹⁶

Ms. Farlinger told me that new development activity arises constantly; it is therefore a “balancing” process to adjust the system so that the required monitoring is done and proponents meet the required standards, rather than each and every proposed project being monitored or audited by a habitat biologist.¹⁹⁷ Mr. Bevan similarly spoke about the increase in workload for the Habitat Management Program because of the increase in projects. In his view, DFO needs to do less specific project review and instead have standards in place that proponents can follow to comply with the *Fisheries Act*; DFO then could do more monitoring to ensure that the standards are being met.¹⁹⁸

Because a proponent who complies with an operational statement does not have to submit a proposal for review by DFO, DFO does not have a good sense of what proportion of projects are operating outside the voluntary referral process.¹⁹⁹ DFO conducts some monitoring for compliance with operational statements through the Habitat Compliance Modernization program, but Mr. Crowe said that, because notifications are voluntary, monitoring would primarily be of people who are more likely to be compliant.²⁰⁰ Mr. Nelson suggested that some kind of formal audit process for operational statements would improve habitat protection. Mr. Steele agreed with his suggestion.²⁰¹

Although operational statements are intended to apply to low-risk activities, DFO witnesses testified that some activities are not actually low risk and using the operational statement contributes to incremental harm.²⁰² Mr. Salomi explained how some activities can be low impact in certain circumstances but, in other circumstances, for instance when they are undertaken in areas with significant existing development, he would not categorize these activities as low risk.²⁰³ Another challenge I heard about the use of operational statements is that it allows for the avoidance of comprehensive planning in an area because each activity is only considered independently; whereas, in the past, when a proponent asked if an authorization was required, DFO could encourage the proponent

and/or local governments to do more comprehensive planning of multiple projects.²⁰⁴

Mr. Crowe also told me that DFO does not do compliance monitoring of best management practices because there are no resources for this monitoring and the activities to which best management practices apply are considered relatively low risk.²⁰⁵

Environmental assessment

The *Canadian Environmental Assessment Act** is intended “to ensure that projects are considered in a careful and precautionary manner before federal authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental effects.”²⁰⁶ The CEAA is implemented by many federal departments and agencies, including DFO, Natural Resources Canada, Environment Canada, Indian and Northern Affairs, Health Canada, and the National Energy Board, to name just a few. These departments may act as “responsible authorities” under the CEAA and be responsible for the environmental assessment of proposed development projects.

A similar provincial act, the *BC Environmental Assessment Act*, may concurrently review projects requiring CEAA review that may impact Fraser River sockeye habitat.²⁰⁷ The *BC Environmental Assessment Act* applies to reviewable projects as defined by the Lieutenant Governor in Council, as well as other projects in limited circumstances.²⁰⁸ Reviewable projects include mines, energy, water management (dams, dikes, water diversion projects, groundwater extraction projects, and shoreline modification projects), waste disposal, food processing, transportation (public highways, railways, ferry terminals, marine port facilities, and airports), and tourist destination resort projects (marine resorts, golf resorts, ski resorts, and other resort developments).²⁰⁹

Where DFO may issue a licence or permit that authorizes a project, in whole or in part, under a provision listed in the *Law List Regulations*²¹⁰ – such as subsection 35(2) of the *Fisheries Act* – DFO

* On June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 1, enacts a new *Canadian Environmental Assessment Act*, 2012 (CEAA, 2012), and repeals the CEAA. A summary of the CEAA, 2012, is set out in Volume 3, Chapter 3, Legislative amendments, where I also address the potential implications of the proposed legislative changes in light of the evidence, findings, and recommendations arising from the Commission’s hearings.

becomes responsible for the assessment of that project as a “responsible authority.”²¹¹ A number of other *Fisheries Act* provisions related to the Habitat Management Program are also listed on the *Law List Regulations*.^{*} The CEAA is also triggered where DFO is the proponent of a project, or where it provides land or funding for a project.²¹² There may be more than one responsible authority for any given environmental assessment under the CEAA. Where this is the case, the responsible authorities determine together the manner in which they will exercise their powers and duties.²¹³

Projects are statutorily exempted from a CEAA assessment if they are listed on the *Exclusion List Regulations, 2007*, if they are undertaken in response to an emergency, or if they are a class of infrastructure project set out by schedule and funded by various federal governmental funding programs.²¹⁴

There are four levels or types of assessment under the CEAA: screening, comprehensive study, review panel (or joint review panel), and mediation.²¹⁵ As a responsible authority, DFO does not “approve” a project under the CEAA. Rather, in a screening, DFO reaches a conclusion about the likelihood of significant adverse environmental effects and determines whether permits may be issued (this is called a “course of action decision”).²¹⁶ In a comprehensive study for which DFO is a responsible authority, after the Canadian Environmental Assessment Agency conducts the assessment and the minister of the environment issues a decision statement, DFO must decide on a course of action under subsection 37(1).[†] DFO is also responsible, at the conclusion of a comprehensive study, for ensuring the implementation of mitigation measures.²¹⁷

After a CEAA assessment, DFO must decide whether to exercise its regulatory authority under the *Fisheries Act*. For example, it must decide whether to issue a HADD authorization under subsection 35(2) and, if it does, on what conditions, taking into account mitigation measures considered in the CEAA assessment. DFO is not permitted

to issue any authorization or permit until the assessment is concluded.²¹⁸ Finally, at the end of a CEAA assessment, DFO may also be required to design and implement a follow-up program. Such a program may include monitoring; it is intended to verify the accuracy of the assessment and determine the effectiveness of mitigation measures.²¹⁹

In the Pacific Region, OHEB is generally responsible for conducting assessments for which DFO is a responsible authority. Regional headquarters is focused primarily on major projects through its Environmental Assessments and Major Projects division. Responsibility for conducting CEAA assessments of project proposals that are not major projects lies primarily with area offices.²²⁰

Public participation is not mandatory in a CEAA screening. Rather, as a responsible authority, DFO may choose to include and facilitate public participation in its screening-level assessments.²²¹ The CEAA Guide: Applying the *Canadian Environmental Assessment Act* for the Fish Habitat Management Program (Habitat Management Program’s 2001 CEAA Guide)[‡] states that “[the Habitat Management Program] is strongly committed to addressing public concerns in EA [environmental assessment].” At the Commission’s request, the department reviewed the Program Activity Tracking for Habitat (PATH) database to confirm the number and percentage of CEAA screenings in British Columbia in the last five years, for which it, as a responsible authority, allowed public participation pursuant to section 18 of the CEAA. Since January 1, 2005, as a responsible authority in 296 screenings under the CEAA, it had not allowed public participation for any project proposed for the Fraser River basin.²²²

Habitat monitoring

Habitat monitoring is an essential tool to determine whether No Net Loss is being achieved.²²³ Staff of the Pacific Region Habitat Management

* Other provisions listed in the *Law List Regulations* that trigger the application of the CEAA, which are relevant to DFO’s Habitat Management Program, are ss. 22(1), 22(2), 22(3), 32, 37(2), and 36(5)(a)-(e). The regulation made pursuant to those paragraphs contains a provision that limits the application of the regulation to a named site.

† DFO also has responsibilities under ss. 37(1.1) and (1.3) for considering and, with the approval of cabinet, responding to a mediator or review panel’s report.

‡ In 2001, Habitat Management Program released the Habitat Management Program’s 2001 CEAA Guide. It is intended for internal use and is not currently available online.

Program are responsible for habitat monitoring activities. As described below, there is a Habitat Monitoring Unit (HMU), but other staff also participate in monitoring. The Pacific Region Habitat Management Program has set a goal of 20 percent of non-Habitat Monitoring Unit staff time for monitoring activities.²²⁴ However, according to Mr. Carter, approximately 5 percent is the best estimate of time actually spent monitoring by staff who are not in the HMU.²²⁵

The Habitat Management Program distinguishes among three categories of habitat monitoring: compliance monitoring, effectiveness monitoring, and fish habitat health monitoring.²²⁶ *Compliance monitoring* involves DFO staff ensuring that proponents comply with any conditions of authorizations or orders and that developments conform to any advice aimed at avoiding negative effects to fish and fish habitat. These factors can be determined by collecting data through site visits or by obtaining reports from the proponent or a third party, which may be a condition of the HADD authorization.²²⁷ Identifying areas for improvement in management systems or areas of risk is another part of compliance monitoring.²²⁸ *Effectiveness monitoring* involves verifying that mitigation and compensation measures effectively achieve their intended outcomes.²²⁹ *Fish habitat health monitoring* is “ecosystem-level” monitoring to measure the effects of development activities on fish habitat when those effects are not clearly known in advance, to establish baseline conditions within a watershed, and to determine the cumulative effects of multiple works or undertakings on productive capacity of fish habitat and the health of the aquatic system.²³⁰ Fish habitat health monitoring is sometimes referred to as “aquatic health monitoring,” “ecosystem monitoring,” or “effects monitoring.” This type of monitoring is akin to WSP Strategy 2 monitoring.²³¹

The Habitat Management Program does compliance monitoring. The program is only at the early stages of work on effectiveness monitoring, and it does not yet do any fish habitat health monitoring. Mr. Carter testified that nationally, within DFO, there is recognition that there will be a stepwise rollout of monitoring, beginning with compliance monitoring; effectiveness monitoring and fish habitat health monitoring will then come with time.²³²

As discussed above, Habitat Compliance Modernization is the sixth element of the EPMP. It was intended to develop a nationally coherent, risk-based approach to compliance with the habitat protection provisions of the Act.²³³ There are three components: (1) Habitat Compliance Decision Framework; (2) National Habitat Compliance Protocol between the Habitat Management Program and the Conservation and Protection Directorate; and (3) habitat monitoring.²³⁴

The first component to habitat modernization, the Habitat Compliance Decision Framework (Compliance Framework) is, according to DFO, the development of an integrated, risk-based, nationally coherent approach to habitat compliance management. The Compliance Framework is found in the Standard Operating Policies Manual. It provides guidance to Habitat Management Program staff in assessing compliance risks, making compliance decisions, and providing a rationale for those decisions.²³⁵ It also provides guidance to Conservation and Protection staff.²³⁶ The Compliance Framework focuses solely on compliance monitoring and responding to situations of potential non-compliance. It divides compliance monitoring into two broad categories: (1) monitoring of reviewed works or undertakings (those that have been through the referral process, including those where an operational statement applies); and (2) monitoring of works or undertakings that have not been reviewed.²³⁷

The second component of Habitat Compliance Modernization, the National Habitat Compliance Protocol, is to clarify the roles, responsibilities, and accountabilities of both the Habitat Management Program and Conservation and Protection. The National Habitat Compliance Protocol between the Habitat Management Program and the Conservation and Protection Directorate was signed in January 2007.²³⁸ The 2007 protocol was replaced in 2010 by a similar agreement (Compliance Protocol).²³⁹

The Compliance Protocol establishes “lead” and “support” roles for the Habitat Management Program and Conservation and Protection. The Habitat Management Program leads in:

- identifying habitat compliance promotion, monitoring, and management priorities, and integrating these priorities into Habitat Management Program work plans;

- educating, training, partnering agreements, and stewardship to promote compliance;
- habitat compliance monitoring;
- determining risk to fish and fish habitat based on the compliance risk assessment in the Compliance Protocol;
- determining the level of compliance risk;
- conducting activities aimed at voluntary restoration in response to lower-risk compliance issues;
- making recommendations to prosecute and follow up monitoring on compliance issues; and
- gathering, tracking, and maintaining information related to compliance promotion, monitoring, occurrences,* and responses through the national PATH database.²⁴⁰

Mr. LeBlanc succinctly summed up the division of responsibilities as follows:

First and foremost, they're shared. And in some cases, there's a lead with Habitat and then a lead with Conservation Protection. The lead in the monitoring and auditing function is with the Habitat program. The determination of risk associated with the non-compliance is joint work. And where there is an enforcement action to be taken based on a decision to proceed with the prosecution and conservation and protection, the Fishery officer take[s] the lead with the support of Habitat biologists or staff.²⁴¹

Because of the division of responsibilities set out in the Compliance Protocol, Habitat Management Program staff are no longer designated as inspectors.²⁴² Instead they are designated as fishery guardians with limited powers, while Conservation and Protection fishery officers are designated as inspectors (for further discussion, see Chapter 7, Enforcement). This change means that Habitat Management Program staff can no longer write up an inspector's direction ordering work to be stopped if a violation is occurring; rather, they must call on a fishery officer to do so.²⁴³

The Compliance Protocol contemplates that revised regional operational protocols will be

developed between the Habitat Management Program and Conservation and Protection "to reflect the operating environment and operational needs unique to each region."²⁴⁴ According to Mr. Nelson, initial discussions have occurred in the Pacific Region about developing this new protocol.²⁴⁵

The third and final component of Habitat Compliance Modernization involves strengthening the Habitat Management Program's capacity to conduct habitat monitoring. DFO addressed this goal by creating a Habitat Monitoring Unit with approximately 12 habitat monitoring positions in the Pacific Region. The positions consist of monitoring biologists and technicians, integrated with each of the area offices, and a regional team leader, habitat monitoring, at regional headquarters. The regional team leader (at the time of the hearings in April 2011, Mr. Carter) reports directly to the regional director, OHEB, and functionally to the national monitoring coordinator. The HMU was not fully staffed until the spring/summer of 2009 although Habitat Compliance Modernization was introduced in 2006. Mr. Carter explained the delay was owing to other OHEB staffing changes from 2007 onward, the need to develop staffing plans, and the need to create positions before staffing could occur.²⁴⁶

At the national level, a working group made up of regional team leaders for habitat monitoring from all of the regions (the National Monitoring Team Leaders Working Group) develops national standards and works on national implementation of monitoring. DFO has not finalized a national habitat monitoring strategy. Mr. Carter testified that a certain amount of national direction would be useful and helpful, but that you need to be able to tailor your program to specific regional circumstances, and therefore, an overly prescriptive national strategy could be difficult. There has also been a "tremendous amount of flexibility offered" to the regions, and the reality is that monitoring is a regional initiative being rolled out somewhat differently in different regions.²⁴⁷

The Pacific Region has developed a Habitat Monitoring Framework for itself that, as of April 2011, was near to final but still in draft. It lays out goals, objectives, priorities, and how and why

* An occurrence is "an observed or reported incident which is a potential violation of a statute or regulation"; occurrence screening is defined as "the initial information gathering and risk assessment of occurrence management used to inform a response decision" (Exhibit 657, p. 3).

monitoring is to be done in the region. Mr. Carter told me that the primary goal is to increase the amount and quality of information available through compliance, effectiveness, and fish habitat health monitoring to support an improvement in current habitat management approaches, which is all in aid of meeting the 1986 Habitat Policy goal of avoiding or minimizing loss of fish habitat.²⁴⁸

Compliance, effectiveness, and fish habitat health monitoring

All three types of monitoring (compliance, effectiveness, and fish habitat health monitoring) are interdependent and, according to Mr. Carter, one is not more critical than the others for ensuring the sustainability of Fraser River sockeye salmon.²⁴⁹

The Habitat Management Program does some compliance monitoring on the regulatory tools that DFO uses – section 35 (HADD) authorizations, letters of advice, and operational statements where proponents provide notification. Typically, a HADD authorization includes conditions requiring a proponent to do some monitoring, but proponents do not normally have to do any monitoring when following a plan confirmed by a letter of advice or when following an operational statement or best management practice. Compliance monitoring is not a very strong surrogate for assessing whether there has been a loss or gain in the productive capacity of fish habitat. In its role in habitat enforcement, compliance monitoring identifies occurrences (circumstances where an unauthorized harm to fish habitat has occurred). HMU staff refer this information to the DFO area habitat biologist, and the biologist then works with Conservation and Protection staff to decide on the level of compliance risk and how to proceed.²⁵⁰

As noted above, the Habitat Management Program is not yet conducting effectiveness or fish habitat health monitoring.²⁵¹ To do effectiveness monitoring, according to Mr. Carter, it is “fairly key” to have baseline inventory information, including general inventory information about a watershed and baseline information in relation to a specific project. He described a few different methodologies that could be applied.²⁵² He explained that OHEB and DFO Science are working on building some of the tools needed to do this work. In his view, the stated DFO timeline for full

implementation of effectiveness monitoring by 2013 is ambitious.²⁵³

Regarding fish habitat health monitoring, there are a number of places where Habitat Management Program staff are collecting inventory information, which is part of this type of monitoring, and under the WSP there is some pilot work on evaluating the status or health of habitat. The latter work is not part of the current Habitat Compliance Modernization initiative, which is mainly looking at project-by-project monitoring. DFO Science is intended to be the lead in developing the methodology to do fish habitat health monitoring.²⁵⁴ The Pacific Region Habitat Monitoring Framework says that DFO hopes to implement fish habitat health monitoring within five years from 2011.²⁵⁵ Mr. Carter said that a lot more work would be needed to establish the methodologies to do this, but that a five-year timeline was not “necessarily unreasonable.”²⁵⁶

Habitat monitoring since the 2009 CESD report

In 2009, the Commissioner of the Environment and Sustainable Development (CESD) reported that DFO did not have a systematic approach to compliance monitoring. The CESD also found that proponents were carrying out the required monitoring in only six of 16 projects involving authorizations and one of 30 projects involving letters of advice.²⁵⁷ After the CESD’s audit, DFO formed the Habitat Monitoring Unit. The first full field season of compliance monitoring by the HMU was 2010. Forty-two percent of sites monitored partially conformed to DFO’s advice on conditions required to protect fish habitat; 36 percent were in complete compliance. In the context of lessons learned from this field season, Mr. Carter stated that clear, specific, and measurable conditions are important to the success of compliance monitoring.²⁵⁸

The 2009 CESD report also recommended that DFO “accelerate the implementation of its Habitat Compliance Decision Framework to ensure that there is an adequate risk-based approach to monitoring projects and providing assurance that proponents are complying with the *Fisheries Act* and all terms and conditions of departmental decisions.” In response, DFO committed to implement the framework and report on the results of project monitoring activities by March 31, 2010,

and annually thereafter.²⁵⁹ In April 2011, Mr. Carter testified that, regionally, DFO had not yet written this report and he had not seen a national report emerge, but the HMU did provide the data that are required to develop such a report. He also said that his role as regional team leader and the unit itself are essentially a response by DFO to this CESD recommendation.²⁶⁰

The HMU cannot monitor projects it does not know about, such as those where a proponent has not filed a proposed project with DFO or provided a voluntary notification.²⁶¹ I heard from DFO witnesses that the department does not have a good sense of what proportion of projects are not part of the voluntary referral process.²⁶² Notification of the use of best management practices is not required or requested. There is no monitoring for compliance by DFO on the use of best management practices, as there are no resources for it and the activities covered are considered relatively low risk compared to other monitoring priorities.²⁶³

According to Mr. Hwang, the fact that there is no monitoring or follow-up on many projects invites non-compliance, an example of which is the re-emergence of non-compliant practices around foreshore development on Shuswap Lake that were previously done in a much more sustainable way.²⁶⁴

As for future funding for the Habitat Monitoring Unit, Mr. Carter said that an increase in funding for compliance monitoring above the 2010 level (which was the first full year of compliance monitoring) is unlikely; this situation causes him concern considering that not only is compliance monitoring to be continued but his group is also supposed to implement effectiveness and fish habitat health monitoring in the near future.²⁶⁵

Data and file management

The primary tool that the Habitat Management Program uses to track and access data and decisions made on its various activities, including habitat referrals, is the Program Activity Tracking for Habitat system, which is a national electronic database. The use of PATH is mandatory for environmental assessments and referrals, including operational statements and notifications. It is optional for other activities such as planning, stewardship, education, partnering, and administrative tasks.²⁶⁶

While PATH is useful for recording decisions, it is not useful for documenting the rationale behind those decisions, such as application of the Risk Management Framework (described above). Its utility is also limited by the willingness and available time of Habitat Management Program staff to enter the data. Obstacles include general inconsistency in data entry, slow access, and an inability to store documents electronically in some offices, a perceived resistance to change, time constraints and high workloads, lack of administrative support for habitat biologists, and a preference for “field work” over “desk work.”²⁶⁷

Despite recording information about numerous development activities affecting fish habitats, for a number of reasons, at the time of hearings in April 2011, PATH could not be used to determine cumulative effects or watershed-level impacts. An audit conducted by the BC Interior office concluded that “[m]andatory PATH fields do not collect data required to assess program performance [No Net Loss].”²⁶⁸

Adequate data and file management practices are important to providing support for habitat monitoring activities. However, information in DFO project files is often not available or is difficult to obtain. Information related to referrals is stored in combinations of paper and electronic files, centrally and with individual staff, in ways that are not standardized across the region. In 2009, the CESD examined the department’s management of project referral information. The commissioner reported that some documentation required by departmental policies could not be located, including identification of impacts to habitat, documentation of risk assessment, and monitoring plans. Since the 2009 CESD report, DFO has worked on improving PATH, and there has been some work on file management protocols, but according to Mr. Carter, not all the issues identified by the CESD have been addressed.²⁶⁹

Some of the information resulting from monitoring efforts is entered into PATH, although a separate, specific Habitat Monitoring Unit system to track monitoring appears to be in development.²⁷⁰

Environment Canada has an electronic database, the Regulatory Information Submission System (RISS), into which pulp and paper mills and metal mines can enter their effluent monitoring results (under the *Pulp and Paper Effluent Regulations* and *Metal Mining Effluent Regulations*).²⁷¹ These data do not include those from environmental

effects monitoring (EEM – see the contaminants section of this chapter for a description of EEM) of pulp mills. However, metal mines are required to submit quarterly and annual effluent monitoring results, as well as EEM results, through RISS.²⁷² RISS is primarily used to monitor compliance.²⁷³

The Canadian Coast Guard is responsible for responding to marine spills and for cleanup activities, including maintenance of the Marine Pollution Incident Reporting System (MPIRS). MPIRS has a data field for information about effects on wildlife, but, given the nature of the spill response, the information in this field relates to dead or living oiled wildlife. Potential longer-term impacts on wildlife, including fish, are not caught by this field.²⁷⁴

Findings

Management of Fraser River sockeye habitat is an area of overlapping jurisdiction among the Department of Fisheries and Oceans (DFO), the province, and local governments. Effective protection of Fraser River sockeye habitat requires DFO to work co-operatively with the province, which has jurisdiction over water and land use. The Wild Salmon Policy (WSP) explicitly recognizes the need for this co-operation.²⁷⁵ I accept the evidence of Jason Hwang, area manager, Oceans, Habitat and Enhancement Branch (OHEB), BC Interior; Rebecca Reid, regional director of OHEB from 2007 to 2010; Michael Crowe, section head, Habitat Management Program, OHEB, BC Interior; Corino Salomi, area manager, OHEB, Lower Fraser; and Dave Carter, area manager, OHEB, Lower Fraser, that, although there are broad, overarching federal-provincial agreements regarding management of fish habitat, DFO regional headquarters has not provided guidance on how Habitat Management Program staff and the province are to coordinate their habitat work.

I accept evidence that the cumulative impacts of development projects (because of the collective effect of habitat degradation and loss arising from multiple projects in an area) affect fish habitat and thus we need to manage the cumulative, incremental harm that could have a substantial negative effect on Fraser River sockeye habitat. The habitat management system that DFO has in place does not address these harms adequately.

The 1986 Habitat Policy is a key national policy intended to guide DFO's protection of fish habitat. It recognizes that fish habitat is required to sustain fisheries resources and aims in the long term to achieve net gain in the productive capacity of fish habitat. I accept the evidence of Mr. Hwang that the 1986 Habitat Policy is valuable in protecting the productive capacity of fish habitat, as well as the documentary evidence that salmon habitat, including that of Fraser River sockeye, is better off today than it would have been without this policy and its No Net Loss principle.

It is apparent to me from the evidence on the implementation of the 1986 Habitat Policy and the Wild Salmon Policy (WSP) that these policies are distinct but complementary. Implementation of one policy will advance implementation of the other – the ultimate goal of both being to maintain and restore fish populations, including Fraser River sockeye. The 1986 Habitat Policy aims to do this by focusing on the protection, restoration, and creation of fish habitat generally, in part through a framework of project review. The WSP works toward a related goal of conserving and protecting Pacific salmon by focusing on conservation of these stocks through specific habitat, fisheries management, and strategic planning processes.

I accept the documentary and testimonial evidence that DFO is not achieving No Net Loss of fish habitat, which is a guiding principle of the 1986 Habitat Policy. On the evidence, it is also apparent that DFO does not measure habitat loss or gain. To do so, it requires habitat indicators, such as those contemplated by Strategy 2 of the WSP, but, as discussed in Chapter 10, Wild Salmon Policy, almost nothing has been done to implement Strategy 2. I note that there are practical recommendations for how to achieve and measure No Net Loss in DFO's 2006 Quigley and Harper evaluation and these could be revisited with a focus on Fraser River sockeye habitat. Further, past reviews of DFO's efforts to protect fish habitat found that the department has met neither the net gain objective nor the No Net Loss principle (see the 1997 and 1999 reports of the Auditor General and the 2004 and 2009 reports of the Commissioner of the Environment and Sustainable Development [CESD]). Like these previous reviews, I conclude that the 1986 Habitat Policy has not been fully implemented. Moreover, DFO has not developed a plan to fully implement it.

Lack of funding within the Habitat Management Program for WSP implementation, as described in Chapter 10, Wild Salmon Policy, has exacerbated the problem of developing habitat indicators, which are required for implementation of both the WSP and the 1986 Habitat Policy. Implementing Strategy 2 of the WSP would advance implementation of the 1986 Habitat Policy by providing DFO with a method to assess Fraser River sockeye habitat loss or gain. The habitat inventory information needed to estimate gains and losses in Fraser River sockeye habitat is in effect the same information required under Strategy 2 of the Wild Salmon Policy.

The Auditor General and the Commissioner of the Environment and Sustainable Development both found that DFO has not met its 1986 Habitat Policy objectives, and the evidence before me was that the department has not yet completed the policy's implementation. In response to this evidence, Claire Dansereau, deputy minister, told me that the department hopes to have a new habitat policy.²⁷⁶ Based on the evidence I heard, the 1986 Habitat Policy is a valuable tool for the protection of productive Fraser River sockeye habitat. In my view, DFO does not need a new habitat policy; it needs to complete implementation of the 1986 Habitat Policy. Although the policy may need updating to address changes in case law and legislation, including the changes to the *Fisheries Act* contained in Bill C-38 (see discussion in Volume 3, Chapter 3, Legislative amendments), its goals and its No Net Loss principle are sound and should be retained.

Downsizing within DFO and the disengagement of the province in many joint habitat management activities have resulted in the department placing greater reliance on streamlining processes to manage impacts on fish habitat. I heard convincing testimony from several DFO Habitat Management Program staff that this streamlining, as well as budget reductions, has had a negative impact on DFO's ability to protect Fraser River sockeye habitat. I acknowledge the sentiment, expressed by several witnesses, that, given the current fiscal regime and increasing development activity, DFO cannot review all proposed projects. However, as David Bevan, associate deputy minister, and others testified, more monitoring is required if there is to be less project review.

Although there have been some improvements in monitoring since the 2009 CESD report made

its recommendations, I am concerned about DFO's ability to monitor impacts of development on Fraser River sockeye habitat. At the time of the hearings, if a project proponent did not file a proposed project with DFO, the department was unable to monitor the project because it might not know that the project existed. DFO's reliance on streamlined processes such as operational statements and/or best management practices means that for many projects notification is voluntary or not required. The shift away from project-by-project review and toward a proponent or professional reliance model demands a strong emphasis on monitoring. Despite the fact that DFO acknowledges that monitoring for compliance, effectiveness, and fish habitat health are all important for ensuring the sustainability of Fraser River sockeye, at the time of the hearings, DFO was only doing some monitoring for compliance and no effectiveness or fish habitat health monitoring.

I accept the evidence of Mr. Carter that, although DFO has done some work to improve its file management protocols in response to problems identified in the 2009 CESD report (missing policies and other documents), it has not yet addressed all the issues identified.

I discuss these findings and any related recommendations in Volume 3 of this Report.

■ Freshwater habitat

In this section, I summarize the evidence I heard about specific habitat issues in the freshwater environment: management of riparian areas, water use, gravel removal, and forestry. Although forestry is a stressor that can also affect marine habitat, the focus of the Commission's hearings was on the management of this activity in the Fraser River watershed.

The provincial *Riparian Areas Regulation*

Riparian areas are vegetated shorelines of a stream or lake that are a critical component of the water body and can affect fish habitat.²⁷⁷ Mr. Crowe told me about the importance of riparian areas to fish:

Sockeye, other salmon and trout are very dependent on healthy aquatic ecosystems. You cannot have healthy fish populations without healthy streams, and that's completely dependent on healthy riparian areas.²⁷⁸

Subsection 12(1) of the provincial *Fish Protection Act* enables the province to “establish policy directives regarding the protection and enhancement of riparian areas ... subject to residential, commercial or industrial development” by regulation. As a result, British Columbia enacted the *Riparian Areas Regulation*.²⁷⁹ The RAR came into force on March 31, 2006, repealing the *Streamside Protection Regulation*.²⁸⁰ The RAR provides many local governments with direction to improve the protection of fish and fish habitat in British Columbia.²⁸¹ Its purpose is to “establish directives to protect riparian areas from development so that the areas can provide natural features, functions and conditions that support fish and life processes” and to facilitate co-operation between DFO, the provincial Ministry of Environment, and the Union of BC Municipalities.²⁸²

On July 16, 2008, DFO, the Ministry of Environment, and the Union of BC Municipalities entered the Intergovernmental Cooperation Agreement Respecting the Implementation of British Columbia's Riparian Areas Regulation. The agreement defines the roles and responsibilities of the parties and creates a management structure to oversee the implementation and ongoing delivery of the RAR.²⁸³

The RAR applies only to new residential, commercial, and industrial development on land under local government jurisdiction in the Lower Mainland, on much of Vancouver Island, in the Islands Trust area, and in parts of the southern interior. Where it applies, the RAR covers all streams, rivers, creeks, ditches, ponds, lakes, springs, and wetlands that are connected (above ground) to a body of water that provides fish habitat. It does not apply to marine or estuarine areas.²⁸⁴

Under the RAR, development activities include the following:

- a. Removal, alteration, disruption, or destruction of vegetation;
- b. Disturbance of soils;
- c. Construction or erection of buildings and structures;
- d. Creation of non-structural impervious or semi-impervious surfaces;
- e. Flood protection works;
- f. Construction of roads, trails, docks, wharves, and bridges;
- g. Provision and maintenance of sewer and water services;
- h. Development of drainage systems;
- i. Development of utility corridors; and
- j. Subdivision as defined in s. 872 of the *Local Governments Act*.²⁸⁵

The RAR does not apply to development or development variance permits issued to enable reconstruction or repair of permanent structures if the structure remains on its existing foundation.²⁸⁶ It also does not apply to agriculture and mining activities, hydroelectric facilities, forestry, federal and First Nations reserve lands, parks and parkland, and institutional developments. Nor does it apply to existing permanent structures, roads, and other development within the riparian protection area or developments that were approved before the RAR was enabled.²⁸⁷

Local governments covered by the Regulation are required either to include riparian area protection in accordance with the RAR in their bylaws or to ensure that their bylaws meet or exceed the protection set out in the RAR.²⁸⁸ A number of Lower Fraser municipalities have maintained the riparian protections they had in their bylaws pre-RAR, which were adopted as part of the repealed *Streamside Protection Regulation*.²⁸⁹

Under the RAR, a proponent must have an assessment report completed by a qualified environmental professional* (QEP) before

* Under the RAR, s. 1(1), qualified environmental professionals are individuals or groups of applied scientists or technologists that meet the following requirements: (1) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association; (2) the individual's area of expertise is recognized in the assessment methods as one that is acceptable for the purpose of providing all or part of an assessment report in respect of that development proposal; and (3) the individual is acting within that individual's area of expertise.

development may be approved or allowed by local governments.²⁹⁰ The *Riparian Areas Regulation Implementation Guidebook* (RAR Guidebook) provides guidance to QEPs, local governments, Ministry of Environment staff, landowners, developers, community organizations, and others regarding the RAR process and requirements.²⁹¹ Completed QEP assessment reports must be submitted to the provincial Ministry of Environment, which then notifies local governments of the report. Local governments may approve a development if the QEP assessment report says one of the following two things:

- (a) if the development is implemented as proposed there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area, or
- (b) if the streamside protection and enhancement areas* identified in the report are protected from the development, and the measures identified in the report as necessary to protect the integrity of those areas from the effects of the development are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area.²⁹²

If a proponent is compliant with the RAR, DFO accepts that there will be no HADD.²⁹³ If implementing a development proposal would result in a HADD in the riparian assessment area, a local government may nonetheless allow or approve the development if the minister of fisheries and oceans or a regulation under the *Fisheries Act* authorizes that HADD.²⁹⁴

There are two ways of assessing streamside protection and enhancement areas (i.e., required setbacks) under the RAR: the simple method and the detailed method. The simple method involves

adopting the repealed *Streamside Protection Regulation* setbacks, and the detailed method is new to the RAR. If a local government has already adopted the simple method in their bylaws, then that is used; otherwise, the QEP decides which method to use in his or her assessment.²⁹⁵

The provincial Ministry of Environment notifies DFO of requests for variances to the streamside protection and enhancement area recommended in the QEP assessment report, and until the time of the hearings in spring 2011, DFO has been responsible for approving these variances.²⁹⁶ Whether this process will remain in place, however, is in question because of a recent court challenge to the delegation of this responsibility to DFO.²⁹⁷ In *Yanke v. Salmon Arm (City)*,²⁹⁸ Justice Meiklem held (in the alternative) that developments that require variances to the streamside protection and enhancement area but that do not result in a HADD do not require approval by DFO or the Ministry of Environment. Subsequently, the BC Court of Appeal upheld the lower court judgment, including this aspect of the ruling. Justice Groberman, for the court, stated that section 4 of the RAR does not prohibit development within a streamside protection and enhancement area where an assessment states that there will be no HADD resulting from the development. There is nothing in section 4 of the RAR that allows DFO to veto a development proposal that is before a local government where the QEP has given an opinion that the proposed development will not result in a HADD.²⁹⁹

Stacey Wilkerson, riparian areas regulation coordinator, Ecosystems Branch, Ministry of Environment, explained that the province can reject an assessment report if it is incorrect or incomplete, but, once a report has been accepted by the Ministry of Environment and the local government has carried on with the development approvals, the province cannot do anything to stop the development process. She also said that the RAR does not prescribe how riparian areas protection should be implemented or require local government to monitor whether a QEP assessment report has been

* Under the RAR, s. 1(1), a streamside protection and enhancement area is an area:

- a) adjacent to a stream that links aquatic to terrestrial ecosystems and includes both existing and potential riparian vegetation and existing and potential adjacent upland vegetation that exerts an influence on the stream, and
- b) the size of which is determined according to this regulation on the basis of an assessment report provided by a qualified environmental professional in respect of a development proposal.

correctly implemented.³⁰⁰ As noted above, once the RAR requirements have been met, DFO deems that there will be no HADD. Mr. Hwang testified that, under the RAR, municipalities have the delegated power to decide whether a development will proceed. As a result, some projects could be deemed compliant with the RAR, even though they would have been considered to constitute a HADD if reviewed under DFO's habitat referral process.³⁰¹

Monitoring and compliance

The Ministry of Environment has started compliance monitoring for the RAR and is currently working on an effectiveness monitoring plan although the time frame for developing this plan is uncertain.³⁰² Compliance monitoring in relation to the RAR is broken into three components: QEP, local government, and developer compliance.³⁰³ DFO and the ministry agreed on a RAR compliance target or benchmark of achieving 90 percent compliance with 90 percent confidence levels.³⁰⁴ The ministry has produced one draft compliance report (2007 Compliance Report).³⁰⁵ According to Ms. Wilkerson and documentary evidence tendered at the hearings, the result of the compliance monitoring to date indicates low compliance with the Regulation.³⁰⁶

For the first three years after the RAR came into force (2006–7 to 2009–10), the Ministry of Environment determined QEP compliance with the RAR reporting requirements by reviewing every report submitted by a QEP in each year (results are set out in the 2008–2009 Annual Report). This review determined whether QEPs were adhering to the RAR methodology. The results have not been published, though a near final draft was marked in evidence at the hearings. The ministry has now moved to more of an audit function where every fifth report is audited unless there are particular concerns with specific QEPs. When the assessment reports were examined, 48 percent of non-compliance was found to be attributable to errors by the QEP. The ministry notified QEPs of the results of its review and, if the errors were considered a serious concern, then the ministry had “more serious discussions with” the QEP and with his or her professional association. The QEP training course has also been improved based on some of the compliance information collected,

although Ms. Wilkerson said that this course is not mandatory for QEPs.³⁰⁷

Sixty percent of local governments were found to be compliant. Ms. Wilkerson stated that non-compliance in this context meant that 40 percent of local governments did not have the appropriate bylaws or process in place to trigger regulatory action under the RAR.³⁰⁸

For sites monitored on Vancouver Island, developer compliance was found to be 38 percent. On the BC mainland, developers were responsible for 52 percent of the sites that were non-compliant. However, the 2008–2009 Annual Report on implementation of the RAR notes that there were many reports of development occurring without the benefit of a RAR assessment and QEPs have reported that, in some areas, sites are regularly cleared of vegetation before the QEP is called in to perform an assessment.³⁰⁹

At the time of the hearings, no further analysis of compliance data had been completed since the 2008–2009 Annual Report and 2007 Compliance Report were completed in May 2009, and no changes to the RAR were made on the basis of compliance-reporting results.³¹⁰ DFO is not engaged formally in RAR monitoring, although Mr. Crowe testified that there is some participation by DFO staff on an opportunistic basis.³¹¹

Regulation of riparian areas

Ms. Wilkerson, Mr. Crowe, and Mr. Salomi presented their views on how well the current riparian protection regime under the RAR and the *Fisheries Act* work together to protect Fraser River sockeye habitat. These witnesses agreed that the main benefit of the RAR is that it requires local governments (where the RAR applies) to have riparian protection in their bylaws, which was not a requirement before the Regulation came into force.³¹² Mr. Crowe noted that having riparian setbacks under regulation (and not just through guidelines) is a substantial improvement and complements the *Fisheries Act*.³¹³ Also, the RAR applies to brownfield sites (previously disturbed areas) that are not easily dealt with under the *Fisheries Act* and includes streamside enhancement. It therefore works not just to protect what is already there, as (at the time of the hearings) was required by sections 35 and 36 of the Act, but also to promote restoration and recovery of habitat.³¹⁴ In

Mr. Crowe's view, this is complementary to the 1986 Habitat Policy goal of net gain of productive habitat (see discussion above about implementing the 1986 Habitat Policy).

Witnesses also noted a number of deficiencies with the RAR process:

- The RAR does not apply to all of British Columbia, and where it is applied, it is not applied consistently.³¹⁵
- There are a number of professional classifications that should not be QEPs because these professionals do not bring the right values to their judgments, and the professional reliance model of the RAR allows for too much QEP discretion.³¹⁶
- The RAR does not require follow-up to ensure that the measures that are required in the assessment reports are completed as intended, and there is a need for an enforcement mechanism.³¹⁷
- Delivery through local governments creates a complicated environment for DFO and the province to try to maintain a standard and level playing field; where a local government feels it is not its responsibility to deliver the RAR, then this works against the objectives of the RAR and the *Regulation* is ineffective.³¹⁸
- The RAR is a poor planning tool and makes it difficult for local governments to plan in their regions in a sustainable way because it only requires assessment on a site-by-site basis.³¹⁹
- There are no consistent contacts within DFO for the province to deal with regarding the RAR, and DFO senior management is not focused on the issue.³²⁰
- There is no definition in the *Regulation* of "institutions," which is a category of development that is not covered by the RAR.³²¹
- The setback widths prescribed in the RAR for many smaller and steeper stream classes are inadequate to protect the stream and stream functioning in the riparian zone.³²²
- There should be some effort to look scientifically at the assessment of RAR's efficacy in support of compliance work.³²³

Another regulatory gap exists between the RAR and the provincial *Water Act*.³²⁴ Lands adjacent to water courses may be privately owned, but the land between the low- and high-water marks in

lakes, rivers, and streams is owned by the province, and the provincial *Water Act* controls works in and around a stream (see discussion below about water use on the Fraser River watershed). According to Mr. Crowe, the province interprets "in and around streams" to mean that works above the high-water mark are not covered by the *Water Act*, and therefore no provincial approvals are required for work above this boundary. However, the RAR applies from the one-in-five-year flood elevation, which is higher than the high-water mark, so there is a physical gap between where the *Water Act* and the RAR apply. Mr. Crowe indicated that, in DFO's view, the province has jurisdiction and should be regulating in this area.³²⁵

Lakeshore / riverfront development

Lakeshore and riverfront areas are riparian areas. As such, they are sensitive and productive fish habitat, and they play a crucial role in ensuring healthy fish populations.³²⁶ Several public submissions suggested that development along lakes and rivers may be responsible for the decline in Fraser River sockeye productivity.³²⁷

Lakeshore and riverfront development often affects shoreline stability, putting it at risk for erosion. Stabilization practices include work to protect bank shores from erosion and, although individual stabilization projects may have minimal impact, the cumulative effect may be significant, as protecting or armouring stream banks in one area increases the potential for erosion problems elsewhere. Shoreline development works can also have other significant impacts, such as the removal of riparian, bank, and foreshore vegetation in addition to stabilizing structures limiting the use of the foreshore by fish.³²⁸

Stream channel alteration in the flood plain ecosystem is often undertaken in areas where flooding threatens human activities. Alterations associated with river instability, seasonal floods, and the migration of channels may be done by diking, dredging, ditching, and land filling.³²⁹ Emergency flood projects requiring formal authorization from DFO do not require *Canadian Environmental Assessment Act* screening because of the emergency nature of the work.³³⁰ Emergency projects proceed even if habitat compensation is required, and DFO

is flexible on how and when such compensation takes place to ensure timely completion of the primary work. DFO is not involved in granting approvals for flood projects under the Provincial Emergency Program; although it can ask questions, the department defers to the province's assessment.³³¹ However, an emergency exclusion from the CEAA does not change the requirements for habitat compensation under the *Fisheries Act*, section 35. These requirements may be written into a HADD authorization.

In the Shuswap Lake area, 14 government agencies share jurisdiction over the management of fish habitat (and damage caused thereto), water quality (and its degradation), and conflicts among recreational users.³³² These agencies have separate mandates, priorities, and financial pressures, creating a complicated regulatory environment. The RAR applies to some of these areas but not all.³³³ Shuswap Lake is subject to a range of development pressures on habitat.³³⁴ I heard that this foreshore development, as well as septic inflows into Shuswap Lake, are affecting fish habitat.³³⁵

The Shuswap Lake Integrated Planning Process (SLIPP), launched in 2007, was designed to foster a joint planning process by multiple government agencies, politicians, First Nations, and the public in order to gain control over the type and rate of development and increase government effectiveness in coordinating and filling regulatory gaps in the lake environment. SLIPP has a number of key objectives (or “workstreams”): water quality management, recreational use management, and foreshore development management. An inter-agency technical committee reviews development applications in order to improve decision making and ensure efficiency in the development process.³³⁶

According to Mr. Crowe, SLIPP has refocused agencies on the importance of habitat management of Shuswap Lake, but there is no secure funding for the initiative.³³⁷

The Lakeshore Development Compliance project, a provincial three-year program to collect baseline foreshore habitat data, created an inventory against which to assess compliance with the provincial *Water Act*. The Ministry of Environment,

other provincial agencies, stewardship groups, local governments, and DFO were involved. The project found that compliance with the *Water Act* was extremely low, with the majority of beach creation and docks not authorized. Regionally, the information collected by this project has been used to start collaborative planning processes among different levels of government and stewardship groups. Several regions have used the information to develop guidelines for shoreline management, and some have started to use it to look at implementing compliance actions.³³⁸

Water use in the Fraser River watershed

I received several public submissions on the impact of water use in the Fraser River watershed on Fraser River sockeye. Concerns included the construction of large and small hydroelectric projects,³³⁹ groundwater withdrawals, and the diversion of water from the Nechako River to Kemano, lack of knowledge regarding the impact industrial activities have on groundwater sources,³⁴⁰ and weak protection for small streams and groundwater.³⁴¹ The potential impacts of water use on Fraser River sockeye is discussed in Volume 2 of this Report. In the sections that follow, I discuss surface and groundwater use generally, and more specifically in relation to hydroelectric power projects.

Regulation of surface water use and groundwater extraction

Pursuant to the *Fisheries Act*, DFO is responsible for ensuring that water use, storage, and diversion are carried out in a manner that does not harm fish or fish habitat. Because “migration areas” are included in the definition of fish habitat, the obstruction of fish passage may be considered a HADD.³⁴²

Section 32 of the *Fisheries Act*, which prohibits the destruction of fish by means other than fishing unless authorized by the minister, is also relevant to the regulation of water use.* For example,

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. As discussed in Volume 3, Chapter 3, Legislative amendments, Bill C-38 expands the exceptions to the prohibition on killing fish by other means than harvesting.

DFO has expressed concern that fish mortality may result from entrainment in the structures of hydroelectric facilities or impingement against water intake structures.³⁴³

Mr. Hwang testified that the *Fisheries Act* is generally not enforced against water users. According to him, federal regulatory tools are limited and not particularly well-suited to managing water use for the benefit of fish. He explained that there is “enormous complexity in taking [*Fisheries Act*] authorities and applying them to a water withdrawal situation.” Many streams have multiple users and multiple points and timings of withdrawal, which makes it “very difficult to ... put your finger on exactly which water user may be causing what effect.” There is added complexity in determining whether a particular impact is a natural occurrence or the result of water withdrawals.³⁴⁴

The difficulty of enforcing the *Fisheries Act* with respect to water use is compounded by a lack of capacity for monitoring the effects of water use. Mr. Hwang indicated that there are “very, very few people on the ground between [DFO] and the provincial ministries that are actually able to monitor and assess the habitat quality and the habitat impacts of water use.” However, Mr. Hwang noted that the *Fisheries Act* has value in terms of applying regulatory pressure on water users.³⁴⁵

The province holds property and usage rights to surface and groundwater in British Columbia,³⁴⁶ except insofar as private rights are granted to other persons. British Columbia is thus responsible for the licensing of surface water use and groundwater extraction, including water stored and diverted for the purpose of power generation. The Ministry of Forests, Lands and Natural Resources Operations (MFLNRO) is the provincial agency (at the time of the hearings) in charge of licensing, issuing approvals, and monitoring of surface water and groundwater resources. The Ministry of Environment is responsible for science and knowledge management, as well as the development of policy and legislation for surface water use and groundwater extraction.³⁴⁷

The *Water Act* establishes a system for the allocation of water rights in British Columbia. The

use of surface water for any purpose other than emergency withdrawals and certain domestic uses requires a water licence or approval.³⁴⁸ The comptroller of water rights (comptroller) or a regional water manager has authority to grant, amend, or refuse all or part of an application for a water licence.³⁴⁹

The comptroller or regional water manager is not required to consider instream flows or fisheries impacts when making licensing decisions. Glen Davidson, comptroller and director, Water Management Branch, MFLNRO, indicated that fisheries impacts, though not “always” considered, are commonly considered when issuing licences and are considered for any “significant withdrawal.” He added that the province routinely consults with DFO regarding licensing decisions related to fish or fish habitat.³⁵⁰

The comptroller and regional water managers are required to consider effects on fisheries for licences issued on “sensitive streams” designated under the *Fish Protection Act* (see discussion in the above section on habitat management, policies, and practices, and Chapter 3, Legal framework).³⁵¹ Dr. Craig Orr, executive director, Watershed Watch Salmon Society, noted that the list of sensitive streams “is quite old and needs some updating.”³⁵² When assessing a water licence application on a sensitive stream, the comptroller or a regional water manager is required to consider impacts on “protected fish populations”* and may only issue or amend a licence where the effect on those populations is “likely to be insignificant.”³⁵³ Where impacts are anticipated, a licence may only be issued or amended if the application includes mitigation or compensation measures.³⁵⁴

The comptroller and regional water managers have a limited ability to amend, suspend, or cancel an existing water licence. Although they may restrict water use to ensure that water is available for licensees with earlier priority dates (“first in time, first in right”), they cannot restrict water use for the purpose of protecting fish.³⁵⁵ The minister’s authority is broader. Under section 9 of the *Fish Protection Act*, the minister may issue a temporary order to restrict water use by a licensee if a fish population is threatened during a drought, but must give “due

* The term “protected fish population” refers to a population of fish in relation to which a sensitive stream designation has been made (*Fish Protection Act*, s. 6(1)).

consideration” to the needs of agricultural users before doing so. Section 9 is a relatively new tool, brought into force in response to a drought in 2009, and by the time of the hearings in September 2011, it had only been used once.³⁵⁶

Dr. Orr expressed a concern that a number of streams in British Columbia are “way over-subscribed”³⁵⁷ such that “more water is allocated in licences than is actually available in the hydrograph.”³⁵⁸ Mr. Davidson explained that the province uses the term “fully recorded” as opposed to “over-subscribed.” “Fully recorded” refers to streams where there is no available flow for licensing at certain times of the year. He testified that oversubscription may or may not be a problem for instream flows, because “in some cases ... instream flows have some protection.” He indicated that the province has a number of licensing tools for protecting instream flows, for example:

- licences with conditions that allow the comptroller or regional water manager to vary instream flow requirements;
- licences issued specifically for conservation purposes (e.g., Ducks Unlimited, DFO’s water licence in the Upper Nechako River); and
- water reserves set aside by order in council (e.g., to preserve flow in the Adams River).³⁵⁹

In Mr. Davidson’s view, the province’s tools for protecting instream flows in new water licences “are being used and are pretty good,” but “the problem primarily exists with some of the existing allocation[s].”³⁶⁰

The parts of the *Water Act* that regulate licensing, diversion, and use of water currently do not apply to groundwater.³⁶¹ Under subsection 1.1(2) of the *Water Act*, the provincial cabinet may, by regulation, fix a date on which the licensing provisions of the *Water Act* apply to “ground water,” but this has not been brought into effect.* British Columbia is the only jurisdiction in Canada where a licence is not required for groundwater extraction.³⁶² Although there is no licensing requirement, proposed groundwater extraction may be subject to review under the BC *Environmental Assessment Act*³⁶³ in limited circumstances.³⁶⁴

The *Ground Water Protection Regulation* enacted under the *Water Act*, establishes standards for drilling, altering, and closing wells and requires well drillers and pump installers to register with the province.³⁶⁵ This regulation does not address the licensing of groundwater. If surface water is limited or fully allocated, water users are able to bypass the *Water Act*’s licensing requirements by drilling wells, often adjacent to streams, to obtain groundwater.³⁶⁶

In a report released in 2010, the BC Auditor General was critical of the province’s management of groundwater resources. The report concluded that

- the Ministry of Environment’s information about groundwater is insufficient to enable it to ensure the sustainability of this resource;
- groundwater is not being protected from depletion and contamination or for the purpose of ensuring the viability of the ecosystems it supports; and
- control over access to groundwater is insufficient to sustain the resource, and key organizations lack adequate authority to take appropriate local responsibility.³⁶⁷

I heard from Mr. Davidson that the province is responding to the report primarily through changes being contemplated in the *Water Act* modernization process.³⁶⁸

Water Act modernization

The *Water Act* modernization process began in 2008 with the release of *Living Water Smart: British Columbia’s Water Plan*, which contained a number of commitments related to water law reform.³⁶⁹ The province has indicated that new legislation will be introduced in 2012.³⁷⁰

In February 2010, the ministry released a discussion paper that outlined a number of specific proposals for changing the *Water Act*. Following the release of the paper, the ministry sought feedback from the public, stakeholders, a number of government agencies including DFO, and other interested parties. DFO supported the overall goals and objectives of the *Water Act* modernization, but offered a number of specific

* The term “ground water” is defined in s. 1 of the *Water Act* as “water below the surface of the ground.”

recommendations related to protecting fish and fish habitat and harmonizing the proposed legislation with federal legislation.³⁷¹

Following the feedback process, the Ministry of Environment released a policy proposal for a Water Sustainability Act to replace the current *Water Act*.³⁷² The policy proposal is guided by an “area-based” approach which provides for varying levels of regulatory action in different areas, based on risk, competing demand, and scarcity.³⁷³ The policy proposal also outlines seven specific policy directions for the new legislation:

1. Protect stream health and aquatic environments: With respect to protecting stream health and aquatic environments, the Ministry of Environment proposes to require decision makers to consider instream flow guidelines for all new water allocation decisions, for both surface water and ground water. This requirement would not affect existing licences.
2. Consider water in land use decisions.
3. Regulate groundwater use: Groundwater extraction will be licensed for all large withdrawals throughout the Province. The threshold for a large withdrawal could be in the range of 250 to 500 m³/day for unconsolidated aquifers, and 100 m³/day for bedrock aquifers. In known and chronic problem areas, licensing requirements will likely apply to smaller users, and in some circumstances may apply to private domestic wells.
4. Regulate during scarcity.
5. Improve security, water use efficiency and conservation.
6. Measure and report: Licensees will be required to report actual water use, starting with large surface water and groundwater users province-wide. In known or chronic problem areas, smaller users such as domestic licensees may also be required to report on water use.
7. Enable a range of governance approaches although ultimate accountability will remain with the Province.³⁷⁴

Several of these policy directions were the subject of evidence at the hearings. Regarding the first,

Dr. Orr testified that there must be better protection of instream flows so that fish can be sustained in all river systems; regulations are required rather than guidelines.³⁷⁵ Mr. Hwang agreed that legislated environmental flow standards on fish-bearing streams would be useful to protect fish. He also questioned how well the *Water Act* modernization proposals would apply to existing licences and the issue of oversubscribed streams.³⁷⁶ In response, Lynn Kriwoken, director, Water Protection and Sustainability Branch, Environmental Sustainability Division, Ministry of Environment, said that additional tools for restricting water use may be available in water-stressed or problem areas. One proposed mechanism is to require the development of “water resource assessments” and “watershed sustainability plans,” which could apply to both new and existing licences.³⁷⁷

With respect to the third policy direction (regulate groundwater use), Ms. Kriwoken indicated the province’s intention is not to regulate private domestic wells (approximately 90–95 percent of wells drilled in British Columbia) unless those wells are in water-short areas.³⁷⁸ Mr. Davidson advised that the future licensing regime for groundwater would mirror the current licensing regime for surface water, under which a licence for domestic use is only required in heavy-use areas.³⁷⁹ Ms. Kriwoken advised that the province has yet to identify priority areas, but is currently looking at this issue: “Those operational details have not been fully worked through yet.”³⁸⁰

However, I heard from Dr. Orr that groundwater licensing should not be limited to priority areas and large extractions; rather, there should be complete coverage for all groundwater extractions in the province.³⁸¹ Ms. Kriwoken testified that the province is looking for a practical threshold that is easy to implement. She suggested that a blanket approach that would regulate an individual well on the west coast of British Columbia may not be practical or pragmatic. She said that the province could implement a system requiring a licence for all groundwater extraction, but indicated that, administratively, such a system may require licensing of many thousands of wells.³⁸²

As for measuring and reporting (item 6 above), there is currently no comprehensive program requiring reporting on water use by licensees, although some are required to report because of

the terms and conditions on their licences. The province currently requires some licensees to report on their water consumption, which “depends on the size of the licence and the requirements of each specific licence.” Mr. Davidson stated that perhaps a quarter of the 44,000 water licences in the province (and maybe even less) must report on water use. Licences for domestic use do not require reporting. The province engages in some compliance monitoring of licence conditions, which is generally focused on larger licensees such as hydro projects and industrial users. For smaller licensees, monitoring is done on a “complaint or problem basis.”³⁸³ The proposal under item 6 is to increase the reporting starting with large water users rather than domestic users.³⁸⁴

A small proportion of DFO Habitat Management Program staff time in the BC Interior office is assigned to monitoring stream flow conditions in areas where there are high salmon values and known limitations on water supply.³⁸⁵ According to Mr. Hwang, from DFO’s perspective, having mandatory metering and monitoring would be useful because

right now you can go out to a licensed water user, many of the older historic ones, and you don’t know how much they have taken today, how much they’ve taken this year, and how that effect may or may not be contributing to the current circumstances in a stream. So having some sense of that would then allow more regulatory control[.]³⁸⁶

DFO has, however, expressed concerns about the Ministry of Environment’s proposal regarding measuring and reporting:

Metering is proposed as a requirement for large water users, but the problems facing aquatic ecosystems are often the result of many small, cumulative and incremental withdrawals. How is it contemplated that the broader array of withdrawals will be monitored?³⁸⁷

Mr. Hwang explained that DFO is not “opposed to regulating large users, but the concern would be not having an effective degree of monitoring and regulation on the smaller users.”³⁸⁸

In Mr. Hwang’s view, implementing a new water allocation regime is the biggest challenge: “I don’t see from where I sit currently the Province or any other entity being resourced to actually follow through and deliver ... the results that are contemplated in the new ... legislation.” According to him, DFO has not urged the province to ensure that sufficient resources are allocated for implementation.³⁸⁹ When asked about resources to implement the new regime, Mr. Davidson would not speculate, saying that this is “a question for government at the time they consider it.”³⁹⁰

Regulation of hydroelectric power projects

For hydroelectric power projects, the province issues water licences and enforces compliance with the terms and conditions of licences, and, under the *Fisheries Act*, DFO is responsible for ensuring the facilities do not cause harm to fish or fish habitat.

BC Hydro power projects

BC Hydro is a Crown corporation mandated, among other things, to generate and supply power.³⁹¹ It owns, maintains, and operates a number of hydroelectric power projects in the Fraser River watershed.

Most BC Hydro power projects were first licensed before 1962. In the late 1990s, the comptroller ordered a review of all BC Hydro water licences and required the development of a water use plan for each BC Hydro facility, recognizing multiple water use objectives (e.g., power generation, fish and fish habitat, flood control, recreation, and so on). Water use plans are developed by BC Hydro through a consultative planning process involving multiple parties (government agencies, First Nations, business groups, environmental groups, local residents), including DFO. As of August 2011, the comptroller had approved water use plans for all BC Hydro facilities in the Fraser River watershed.³⁹²

Paul Higgins, former manager, Environmental Resources Department, BC Hydro, testified that water use planning has been beneficial in terms of achieving biological benefits, as well as developing relationships among stakeholders.³⁹³ Mr. Hwang agreed that the water use planning process has been beneficial and he thinks DFO finds water use plans to be very effective.³⁹⁴ Dr. Orr referred to a report by the Watershed Watch Salmon Society that

analyzed fish conservation gains from water use plans at several BC Hydro facilities.³⁹⁵ The report found that the process resulted in generally positive outcomes for fish conservation, as well as net gains for both power and fish in many cases.³⁹⁶

In recent years, the Bridge Coastal Fish and Wildlife Restoration Program has funded studies to assess the feasibility of restoring fish passage at the Alouette and Coquitlam dams, which blocked the sockeye's upriver access.³⁹⁷ A joint initiative of BC Hydro, British Columbia, and Canada, the program funds projects to address the historical impacts of BC Hydro facilities in the Bridge Coastal generation area, which includes the Alouette and Coquitlam facilities.³⁹⁸ Mr. Higgins testified that the Alouette Dam program to re-anadromize sockeye (i.e., to remove obstacles preventing the fish from migrating to, and returning from, the ocean during their life cycle) has shown "good potential" for biological feasibility.³⁹⁹ The program to re-anadromize sockeye at the Coquitlam Dam has been less successful (only six fish returned in 2011).⁴⁰⁰

DFO has issued *Fisheries Act* authorizations under section 32 and subsection 35(2) for the following BC Hydro projects in the Fraser River watershed: Alouette, Coquitlam-Buntzen, Stave River, and Wahleach. These authorizations permit "impacts from upstream and downstream habitat alteration as well as destruction of fish by stranding or entrapment, provided that such impacts occur in association with WUP [water use plans] operations or specified maintenance activities, and in accordance with specific mitigation, compensation and monitoring requirements."⁴⁰¹

Kemano Hydroelectric Project

The Kemano Hydroelectric Project is a hydroelectric facility operated by Rio Tinto Alcan (Alcan). It supplies power to Alcan's aluminum smelter at Kitimat, as well as to BC Hydro.⁴⁰² Alcan generates power by diverting water from the Nechako Reservoir. The diversion of flow from the reservoir reduced annual discharges in the Nechako River by 40–50 percent between the late 1950s and 1978.⁴⁰³ Although the diversion did not block migration to any known sockeye spawning grounds, it appeared to affect

conditions for sockeye runs that use the Nechako River as a migration corridor to the Stuart, Stellako, and Nadina systems.⁴⁰⁴ The concern with respect to Fraser River sockeye is that low water flows in the Nechako River may cause higher summer water temperatures, which in turn can increase stress on migrating adults and make them more susceptible to disease and pre-spawn mortality.⁴⁰⁵ Dr. Steve MacDonald, research scientist and head, Environmental and Aquaculture Research Section, DFO, and Cooperative Resource Management Institute, School of Resource and Environmental Management, Simon Fraser University (SFU)* observed that the temperatures in this stretch of the migratory route are the warmest that these fish will experience in their lives: "This is the hot spot in their entire four- or five- year life cycle."⁴⁰⁶

In 1987, Canada, Alcan, and the province entered into an agreement to address low flows that could be detrimental to sockeye (1987 Settlement Agreement). Under the 1987 Settlement Agreement, Alcan agreed to release additional flow into the Nechako River in the summer months to cool the waters. This program of flow releases is known as the Summer Temperature Management Program,⁴⁰⁷ and its objective is to maintain mean daily water temperatures at or below 20°C as measured at Finmoore, near the Nechako's confluence with the Stuart River.⁴⁰⁸ The temperature program is overseen by the Nechako Fisheries Conservation Program.⁴⁰⁹

In a 2005 report, the Nechako Fisheries Conservation Program found that for the period between 1983 and 2000, water temperatures at Finmoore have generally remained between 15°C and 21°C, while only infrequently exceeding 20°C.⁴¹⁰ Mr. Hwang was DFO's representative to the Nechako Fisheries Conservation Program from 1998 to 2004 and he described the Summer Temperature Management Program as "largely effective, not perfectly so, but within the bounds and limits of the operating infrastructure, it was meeting objectives."⁴¹¹

Dr. MacDonald was the lead author of two DFO reports that examined the effectiveness of the Summer Temperature Management Program in moderating temperatures in the Nechako River. Dr. MacDonald said, "[I]n a nutshell, [the Summer Temperature Management Program] works. And

* Dr. MacDonald was qualified as an expert in aquatic habitat ecology (Commissioner, Transcript, September 15, 2011, p. 3). His curriculum vitae is Exhibit 1846.

it works because, very simply, if you have a large amount of water, it takes more energy to heat it than a small amount of water. It's just an issue of thermal mass." He explained that the program was primarily designed to benefit sockeye that migrate above Finmoore (i.e., Nadina and Stellako populations), but it also affects sockeye that only use the lower Nechako below Finmoore (i.e., Early Stuarts). In other words, "[A]ny fish that turns left at Prince George [at the confluence of the Fraser and Nechako rivers] stands to benefit from temperature control." According to Dr. MacDonald, the Summer Temperature Management Program is a success, benefits sockeye, and DFO is in favour of continuing it.⁴¹² Dr. MacDonald was asked to comment on the following statement from an internal DFO document:

[S]ummer temperatures have been set by the agreement to a maximum of 20 degrees C. Research indicates this temperature to be lethal to salmon particularly when the fish have been exposed to these temperatures during a large portion of their freshwater migration. A maximum target of 18 degrees C at locations in the migration corridor where temperature control is a possibility is more precautionary and scientifically defensible.⁴¹³

Dr. MacDonald said that "if all one was concerned about was sockeye salmon and it was doable, 18 degrees would be better than 20"; however, a lower target would not necessarily be achievable owing to limits on the amount of water that can be released into the system. In some years, the Summer Temperature Management Program "is doing its very best" to achieve the current target of 20°C despite operating at full capacity. He also emphasized there are a "plethora of other interests," in addition to sockeye, that need to be considered when additional water is released (e.g., potential for flooding at Vanderhoof, lost revenue from power generation, potential impacts on the Cheslatta Lake system, and potential impacts on other fish such as sturgeon).⁴¹⁴

Regarding suggestions for improvements, Dr. MacDonald indicated that moving the program's

temperature target to a new location below Finmoore would allow for greater control over temperatures in the lower part of the Nechako. But he also said that such a proposal is "fraught with difficulties." An alternative would be to continue using Finmoore as the location for measuring temperature, but modify the program model based on the understanding that flow releases also affect temperatures below Finmoore. Dr. MacDonald has been working on this analysis for DFO, but said that "it's going to take ... work before we could actually get it into operation."⁴¹⁵

Independent hydroelectric power projects

The term independent power project (IPP) is used to describe a renewable energy project (e.g., hydro, wind, biomass, geothermal, etc.) that is developed independently of BC Hydro, usually by the private sector. IPPs typically enter into electricity purchase agreements with BC Hydro and are connected to the provincial power grid. The scope of evidence at the hearings was limited to IPPs that generate hydroelectric power, referred to in this Report as "independent hydro projects."⁴¹⁶

There are different models for independent hydro projects, but most are "run-of-river" facilities. Run-of-river power is generated by removing water from a stream and diverting it through a tunnel at a steep gradient. Another model for an independent hydro project is where a tunnel is bored into a lake and lake water is used to generate power.⁴¹⁷

Independent hydro projects are subject to both provincial and federal regulation. Regulation of independent hydro projects by DFO's Habitat Management Program generally follows the same referral process as for other types of development (see discussion above). Where an independent hydro project is expected to result in a HADD (section 35) or mortality of fish by means other than fishing (section 32), DFO requires the project proponent to obtain an authorization under the *Fisheries Act*. Before issuing a subsection 35(2) authorization, DFO has to do an environmental assessment under the *Canadian Environmental Assessment Act*.^{*} DFO provides specific guidance

* *Canadian Environmental Assessment Act*, SC 1992, c. 37; Jason Hwang, Transcript, September 16, 2011, pp. 34-35. Part 3, Division 1 of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, enacts a new *Canadian Environmental Assessment Act*, 2012 (CEAA, 2012) and repeals the CEAA. Under the CEAA, 2012, independent hydro projects may no longer require an environmental assessment as they did under the CEAA.

to proponents through its Instream Flow Risk Management Framework.⁴¹⁸ The framework was initially created for independent hydro projects but is not exclusive to them. It is intended to convey to proponents that DFO may not support projects that may impact sensitive or high-value fish habitat, and to encourage them to select projects that have lower risks.⁴¹⁹ Under the framework, projects with “anadromous fish populations and habitats within project impact boundaries and with potential for management concern” are categorized as “high to unacceptable risk.”⁴²⁰ Dr. Michael Bradford, research scientist, DFO, and Cooperative Resource Management Institute, School of Resource and Environmental Management, SFU* said that for DFO this is a “new industry” and it is anticipated that, in the next five to 10 years, DFO will start to see monitoring results that “hopefully will be able to give us a better idea of what the true impacts of these projects are.”⁴²¹

Project proponents must obtain a water licence from the province under subsection 12.2(2) of the *Water Act*. For hydro licences the province often attaches conditions for minimum instream flows to protect fish and fish habitat. Projects with a capacity of 50 MW or greater are subject to review under the BC *Environmental Assessment Act*, but in most cases independent hydro projects do not exceed this threshold. The province has developed guidelines for assessing instream flow requirements for independent hydro projects.⁴²²

Dr. Orr expressed concern regarding the lack of public input with respect to the siting of independent hydro projects: “[A]s a citizen, I don’t know where the next one is going to go. I don’t know if it’s going to go in anadromous fish habitat that might affect sockeye or not.” He emphasized the need for increased “public participation and transparency in the whole process” and cited BC Hydro’s water use planning process as a possible model for small hydro development. Dr. Orr noted that a process does exist for public input but, in his experience, it is time consuming and not very responsive. He also said that the water flow guidelines for independent hydro projects are not rigorously determined or mandatory in contrast to the guidelines developed under water use plans.⁴²³ However, Mr. Davidson indicated that

requiring non-Crown corporations to undertake water use planning would be “a little bit more problematic.”⁴²⁴ Mr. Hwang noted that DFO lacks authority to order water users to undertake water use planning.⁴²⁵

Gravel removal in the Lower Fraser River

Gravel has been removed from the Lower Fraser River on a regular basis since around the 1950s.⁴²⁶ Some members of the public suggested that gravel mining is one of the causes for the decline of Fraser River sockeye.⁴²⁷ Sockeye salmon are not known to spawn in the Lower Fraser River from which gravel is removed. I consider the evidence of the potential impact on migrating and some local rearing sockeye populations in Volume 2 of this Report. Here, I consider only the evidence relating to the management of gravel removal.

Gravel removal is governed by several federal acts and regulations, including the *Fisheries Act*, the *Navigable Waters Protection Act*,⁴²⁸ and the CEAA. Applicable provincial legislation includes the *Water Act*,⁴²⁹ and *Water Regulation*,⁴³⁰ the *Dike Maintenance Act*,⁴³¹ the *Land Act*,⁴³² and *Crown Land Fees Regulation*,⁴³³ and the *Mines Act*⁴³⁴ and its *Health, Safety and Reclamation Code*. Before gravel removal begins, Emergency Management BC must typically receive a number of authorizations (including a section 35 HADD authorization).⁴³⁵ If gravel removal exceeds gravel recruitment, habitat loss can occur; temporary habitat loss can also occur even if gravel recruitment matches removal until a mined area is filled in. To date, DFO has not required habitat compensation for any habitat loss from gravel removal, although it anticipates that this compensation will be necessary based on post-construction monitoring results from removals done in 2010.⁴³⁶

In 2004, Land and Water BC Inc. and DFO signed a letter of agreement with respect to gravel removal from the Lower Fraser River for 2004 through 2008.⁴³⁷ In February 2009, the agreement was extended until March 31, 2010.⁴³⁸ A new agreement was under negotiation at the time of hearings.⁴³⁹

* Dr. Bradford was qualified as an expert in aquatic habitat ecology (Commissioner, Transcript, September 15, 2011, pp. 1, 3). His curriculum vitae is Exhibit 912.

The letter of agreement indicates that the province views gravel removal as necessary to address flood risks associated with accumulation of gravel in the lower reaches of the Fraser River.⁴⁴⁰ DFO's position is that "[t]he provincial government, not the Department, has the authority and responsibility for flood protection, including the management of gravel removal projects." DFO officials defer to Emergency Management BC's "expertise and jurisdiction" in public safety and treat gravel removal as a "public safety priority." The role of DFO in gravel removal is to "manage the fish and fish habitat issues associated with these works," and "DFO seeks to balance the Province's interest in flood prevention with the need to protect fish and fish habitat."⁴⁴¹

A technical committee and a management committee together oversee gravel removal in the Lower Fraser River.⁴⁴² DFO and the provincial Ministry of Environment co-chair the management committee. The BC Integrated Land Management Bureau, Emergency Management BC, the Provincial Emergency Program, and Transport Canada are also represented.⁴⁴³ According to the latest available terms of reference, the purpose of the management committee is "to ensure that gravel removal meets the annual targets in keeping with the Letter of Agreement."⁴⁴⁴ The committee also reviews and approves or rejects gravel removal proposals recommended by the technical committee.⁴⁴⁵ Emergency Management BC chairs the technical committee, which reviews sites and provides recommendations to the management committee with respect to sediment removal.⁴⁴⁶ This committee's terms of reference, which were never finalized, contemplate having a Ministry of Environment representative to provide expertise on hydrology and fish interests, and technical advice for flood protection.⁴⁴⁷ However, there is no Ministry of Environment representative on the technical committee, and this fact has been an ongoing concern for the DFO members of the committee.⁴⁴⁸

A monitoring program is outlined in the letter of agreement.⁴⁴⁹ There is general consensus within

DFO that a more strategic and comprehensive monitoring program is required.⁴⁵⁰ DFO and Emergency Management BC are working on a new monitoring plan but by the time of the hearings in spring 2011 had not finalized it.⁴⁵¹

In 2010, Emergency Management BC's technical committee commissioned a report to define criteria for a program that might be permitted for multi-year sediment removals in a long-term sediment management program.⁴⁵² The report says that a long-term program of sediment removal should only proceed if sufficient research is undertaken to acquire knowledge about the area's sediment budget* and the annual pattern of fish activities.⁴⁵³ The report's cover letter (from the expert commissioned to do the report) notes a concern about the state of knowledge:

The most expensive (and urgent) need is to improve knowledge of the aquatic ecosystem beyond site scale studies in the immediate environs of sediment removals and a limited number of control sites. It is evident that we need to know details about how fish use various parts of the river at various times of year before reasoned objections to sediment removal proposals may be overcome.⁴⁵⁴

Dr. Laura Rempel, habitat biologist, OHEB,[†] said DFO does not know as much as it should in order to manage a long-term gravel removal program; however, gathering the types of data referred to by the report would be very expensive. She said that a precautionary approach would perhaps require DFO to step back and reconsider the program, but because gravel removal is done for public safety reasons, DFO treats gravel removal projects somewhat differently from its regulatory review of strictly economically driven projects.⁴⁵⁵

In 2009, DFO, together with Emergency Management BC, commissioned a study intended to provide a picture of the impacts of gravel mining on the Lower Fraser gravel reach and support design of a comprehensive monitoring program for

* A sediment budget was defined by Dr. Laura Rempel as "an estimate of the net accumulation of sediment, core sediment, that's building up in the reach and it's usually expressed in cubic metres per year. So it's an annual estimate of gravel influx to the reach" (Transcript, June 16, 2011, p. 20).

† Dr. Rempel was qualified as an expert in freshwater fish habitat in flowing waters and rivers, with an emphasis on the Lower Fraser River (Commissioner, Transcript, November 4, 2011, p. 2).

gravel removals.⁴⁵⁶ One of the report's overarching conclusions was that the monitoring program in place was not being executed very diligently, and as a result, data were unavailable and the study could not adequately address questions about magnitude of effect.⁴⁵⁷ Mr. Hwang said there are gaps in monitoring and there is a need for more in situ monitoring as works are undertaken. DFO would like to see this factored into a new management plan for gravel removal. However, monitoring relating to sockeye salmon would not be a DFO priority.⁴⁵⁸ Dr. Martin Rosenau, instructor, Fish, Wildlife and Recreation Technology, British Columbia Institute of Technology,* indicated that with limited funds the priority would be sturgeon, although this would not "diminish the requirement for sockeye to be assessed, as well."⁴⁵⁹

DFO is not able to do a cumulative effects assessment of the impact of gravel removals throughout the entire system because it is not able to forecast what sort of removals might be tabled in the future. This is one reason why DFO would like to see a longer-term comprehensive management program for the gravel reach.⁴⁶⁰ Mr. Hwang pointed out that a longer-term management plan would likely widen the scope of project review under the CEAA† and this change would be positive in that it would allow for an understanding of the larger ecosystem impacts of gravel removal.⁴⁶¹ Dr. Rosenau added that impacts should be assessed on a time scale comparable to morphological and ecological changes (perhaps 10 years or more).⁴⁶² Dr. Rempel said the entire reach should be monitored, not just individual removal sites.⁴⁶³

Forestry

Two levels of government are engaged in management of forestry impacts on fish habitat. Each province has the exclusive authority to make laws

for the development, conservation, and management of forestry resources.⁴⁶⁴ The provincial government regulates the industry by granting licences to harvest timber, stipulating forestry practice requirements, and subsequently granting approval to licensees to carry out forestry activities. It exercises this authority mainly through the provincial *Forest and Range Practices Act*⁴⁶⁵ (FRPA) and the *Forest Act*.† The Ministry of Forests, Lands and Natural Resource Operations (MFLNRO)[§] is the government agency responsible for the management of forest harvesting and the forest industry. DFO is responsible for protecting fish and fish habitat.

FRPA came into force in 2004. MFLNRO presented FRPA as a "results-based" approach to forestry management, relying on the professional reliance principle.⁴⁶⁶ FRPA streamlined the planning process while maintaining tough penalties for non-compliance.⁴⁶⁷ It calls for three operational plans: the forest stewardship plan, the site plan, and the woodlot licence plan. The forest stewardship plan and the woodlot licence plan require approval by the minister of MFLNRO. It also sets out broad objectives (including fish and fish habitat protection objectives), which a licensee must strive to meet when carrying out forestry practices. A licensee must describe its strategies to achieve the objectives set out in FRPA and its regulations.⁴⁶⁸

Developed under FRPA, the *Forest Planning and Practices Regulation* (FPPR) is the main regulation respecting fish habitat. It addresses (among other things): objectives set by government that must be included in the operational plans; practice requirements pertaining to soils, timber and forest health, riparian areas, watersheds, biodiversity, and roads; and reporting requirements. Specific objectives provided for in forest stewardship plans include those related to fish habitat.⁴⁶⁹ The FPPR also sets out requirements for riparian areas.⁴⁷⁰ It establishes stream, wetland, and lake riparian classes and sets restrictions on harvesting and road construction

* Dr. Rosenau was qualified as an expert in freshwater fish habitat in flowing waters and rivers, with an emphasis on the Lower Fraser River (Commissioner, Transcript, November 4, 2011, p. 2).

† As noted above, Part 3, Division 1, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, enacts a new *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) and repeals the CEAA. Under the CEAA, 2012, gravel removal proposals may no longer require an environmental assessment as under the CEAA.

‡ The *Forest Act*, RSBC 1996, c. 157, grants the right to harvest timber in British Columbia and gives the Lieutenant Governor in Council the authority to make regulations to designate Crown land as mountain pine beetle salvage areas.

§ As the name of the provincial ministry responsible for management of forestry has changed a number of times over the years, this defined term refers to all of the previous ministries as well as the current one.

within the riparian management, riparian area zones, and riparian reserve zones.* The FPPR also addresses other topics related to the protection of fish and fish habitat, such as temperature-sensitive streams, stream crossings, and fish passage.⁴⁷¹ Before 2004, and the passing of FRPA, the forest industry was regulated by the *Forest Practices Code* (Code), which comprised the *Forest Practices Code of British Columbia Act*, its regulations, guidebooks, and practice standards, and which included provisions pertaining to the protection of fish and fish habitat.

The transition to FRPA has significantly reduced requirements on industry.⁴⁷² FRPA is a results-based model, whereas the Code was a prescriptive model.⁴⁷³ Despite the transition to FRPA, guidebooks developed under the Code remain important operational tools used by licensees, MFLNRO, and DFO, although they carry no legal weight.⁴⁷⁴ The following are four guidebooks still relevant to the protection of fish and fish habitat created under the Code:

- Coastal / Interior Watershed Assessment Procedure Guidebook (1999);⁴⁷⁵
- Riparian Management Area Guidebook (1995) (RMA Guidebook);⁴⁷⁶
- Fish-stream Identification Guidebook (1998);⁴⁷⁷ and
- Fish-stream Crossing Guidebook (2002).⁴⁷⁸

The province's introduction of FRPA in 2004 coincided with DFO's transition toward its national Environmental Process Modernization Plan (see discussion above in the section on habitat management, policies, and practices). Under FRPA, MFLNRO no longer refers the main operational plans it requires from licensees (the forest stewardship plans) to DFO for review. Since the advent of both FRPA and the EPMP, OHEB's BC Interior and North Coast offices have developed operating principles or position statements to clarify and confirm standards pertaining to forestry practices and activities in their respective areas.⁴⁷⁹

As part of the EPMP, DFO has developed operational statements, a number of which are applicable to forestry activities (see discussion above in the section on habitat management policies and practices).⁴⁸⁰

Forest harvesting

Key fish-forestry issues have been the size of riparian management zones (especially around small fish-bearing streams and their tributaries) and stream crossings (mainly culverts) that can impede fish passage.⁴⁸¹

In February 2000, the regional director general of DFO's Pacific Region wrote to the deputy minister expressing concerns that logging practices were being carried out adjacent to small fish-bearing streams and direct tributaries to fish-bearing streams without allowing adequate riparian leave strips. The letter attached a set of draft interim standards to meet DFO's fish habitat objectives. These interim standards were meant to be a temporary solution until the riparian provisions of the Code were reviewed.⁴⁸²

With the transition to FRPA and the EPMP, DFO's BC Interior office sent a letter to licensees and district managers to confirm DFO's requirements for compliance with the *Fisheries Act*. In this letter, the BC Interior OHEB staff adopted the 2000 interim standards with the caveat that the issue would continue to be reviewed.⁴⁸³ In 2006, DFO, MFLNRO, and the forest industry agreed to make it a priority to revisit the RMA Guidebook in the context of FRPA, the EPMP, and the best available science, with a view to finding consensus on riparian standards. Accordingly, DFO proposed a draft work plan entitled "Review and Update of the Riparian Area Management Guidebook" for DFO, MFLNRO, and the provincial Ministry of Environment. This work plan included a timeline of deliverables that anticipated a redraft of the RMA Guidebook and implementation training to be completed by March 15, 2007.⁴⁸⁴ This draft was not finalized, and the RMA Guidebook has not been updated.

The *Chief Forester's 2010 Annual Report on the Forest and Range Evaluation Program*, released in February 2011, recommended a no-harvest buffer around small fish-bearing streams and all perennially flowing, non-fish-bearing tributaries to them.⁴⁸⁵ In January 2011, Extension Note 100† was developed by MFLNRO, DFO, and Pierre Beaudry and Associates. The extension note recommends

* Riparian management areas and zones and riparian reserve zones are defined in Table 1 of Exhibit 1110 (BC Ministry of Forests, Riparian Management Area Guidebook [1995]).

† MFLNRO publishes its policies or practices in a series called "Extension Notes."

best management practices, similar to those recommendations contained in the RMA Guidebook.⁴⁸⁶

Before the release of the revised Fish-stream Crossing Guidebook (2002), DFO's policy was that all proposed bridges or culverts across anadromous fish-bearing streams were to be referred to DFO for review and comment.⁴⁸⁷ DFO endorsed the Fish-stream Crossing Guidebook (2002), but has since raised concerns about culverts installed before both the Code (1995) and the Fish-stream Crossing Guidebook (2002).

In 2008, the FRPA Joint Management Committee Fish Passage Technical Working Group was formed by MFLNRO, the Ministry of Environment, and DFO to establish a working relationship with a view to identifying and rectifying problem culverts obstructing fish passage. The technical working group estimates that there are approximately 370,000 stream crossings in British Columbia. It also estimates that 76,000 fish-stream culverts need to be assessed and that the estimated number of culverts presenting fish passage problems in the province, which are likely in need of repair or replacement, is 30,000–70,000. The technical working group developed a strategic approach which outlines the process it will follow to address the fish passage issue. It estimates that \$4 million per year is required to allow the group to implement the key elements of the strategic plan.⁴⁸⁸ Peter Delaney, former chief, Habitat Policy Unit and Fish Habitat Unit, and senior program advisor, OHEB, said that it would require hundreds of millions of dollars to fully rectify the fish passage issue in the province.⁴⁸⁹

In 2009, the Forest Practices Board* released the *Special Investigative Report – Fish Passage at Stream Crossings* (2009 Special Investigative Report), which assessed fish passage at stream crossings in the central and northern interior and on Vancouver Island. A total of 1,110 crossings of fish-bearing streams in 19 watersheds were assessed; these crossings were installed before the Code, during the tenure of the Code, and after the passing of FRPA. The report found that only 42 percent of the 1,110 road crossings were sufficiently well designed to allow salmon, trout, and other fish to swim freely above them. The report has only one recommendation: “[T]hat government

take the necessary actions to ensure fish access to valuable habitat is maintained and restored.”⁴⁹⁰ Ian Miller, manager, Sustainable Forestry Management, MFLNRO, supported this recommendation. In terms of what the province is doing to implement it, he said that British Columbia ensures access to habitat is maintained by forest tenure holders by insisting on compliance with provincially legislated requirements through enforcement actions, and that typically the province sees very high rates of success with this approach.⁴⁹¹

In addition, the Forest Practices Board noted that, while section 56 of the FPPR requires licensees to ensure that forestry practices do not have a “material adverse effect on fish passage,” the legislation fails to define “material adverse effect.” As a result, “[I]t became apparent to the Board there are differences of opinion among enforcement agencies about what constitutes a material adverse effect on fish passage and how the assessment methodology for fish passage should be interpreted in the context of enforcement of the legislation.” Accordingly, the Forest Practices Board encouraged the MFLNRO, the Ministry of Environment, and DFO to come to an agreement on what constitutes a material adverse effect and how the legislation should be enforced.⁴⁹²

MFLNRO advised the Forest Practices Board as follows:

- Through the Forest Investment Fund (the primary funder for assessments of crossing structures) approximately \$9 million of provincial funding has been allocated in the past two fiscal years to conduct crossing assessments and to rectify priority (pre-Code) problematic structures. To date, approximately 5,000 stream crossing sites have been investigated, approximately 1,500 sites have been fully assessed, and about 50 restoration / remediation projects have been undertaken at an average cost of \$90,000 per crossing.
- The current focus is to develop a web-based course to develop a strategic approach to crossing assessments and remediation, assessment methodology, and basic fish biology.

* The Forest Practices Board reports to the public on industry and government compliance with British Columbia's forest practices legislation (Ian Miller, Transcript, June 17, 2011, p. 68).

- In collaboration with DFO and provincial Ministry of Environment, MFLNRO created and posted on its website in December 2009 CEPS Bulletin 40 – “Guidance to C&E Program staff and delegated decision makers on interpreting the words ‘material adverse effect’ and ‘material adverse impact.’” MFLNRO says that fish passage assessment for compliance and enforcement will remain a provincial priority for 2010–11.⁴⁹³

The State of British Columbia's Forests, Third Edition (2010), relies on the 2009 Special Investigative Report. Ninety-four percent of the 1,202 sites assessed found forest-road stream crossings to have low to moderate potential to transport sediment into a stream.⁴⁹⁴

Dr. Peter Tschaplinski, research scientist, Fish-Forestry Interactions and Watershed Research, Ministry of Environment, testified about fish habitat passage obstructions, in particular those that are a consequence of improperly installed road-crossing structures in streams.⁴⁹⁵ Many of the impacts he identified are road related.⁴⁹⁶ Mr. Miller agreed that maintenance of fish passage infrastructure has been a problem at stream crossings. However, he also described how the technical working group is tackling these issues and said that a recent provincial funding program called the Land Base Investment Program provides funding for improving fish passage.⁴⁹⁷ Over the past four years, \$15.5 million has been allocated from this program, the bulk of the money going to the collection of assessment data. The province also remediates 10 to 20 crossings every year to fix the “most egregious problems and the ones that are going to give us back access to the best and most habitat that we can.”⁴⁹⁸

When asked if the size of riparian management zones and stream crossings were still key issues for DFO, Mr. Delaney stated that DFO has not reviewed whether its concerns have been addressed.⁴⁹⁹ He was unaware of any structured review by DFO of “State of Stream Channels, Fish Habitats, and their Adjacent Riparian Areas: Resource Stewardship Monitoring to Evaluate the Effectiveness of Riparian Management, 2005–2008” (FREP Report)⁵⁰⁰ but he noted that some of the recommendations coming out of it, such as the 10 m leave strip along streams and the reserve zone, are two items that DFO has been trying to get incorporated into the RMA Guidebook.⁵⁰¹

DFO withdrawal from fish-forestry work

The FRPA Joint Management and Steering committees were formed in 1995 to foster cross-agency communication and decision making on policy initiatives and operational issues related to FRPA. The FRPA Joint Management Committee reports to the FRPA Joint Steering Committee and comprises director-level management members from DFO and provincial agencies. The FRPA Joint Steering Committee comprises assistant deputy ministers of policy and/or operations from DFO and provincial agencies.⁵⁰²

I heard that DFO’s role in forestry issues and fish-forestry interactions has decreased since the mid-2000s, although it is represented on the two FRPA joint committees.⁵⁰³ A DFO document entitled, “BCI Mid-Fraser-Thompson-Okanagan Habitat Management Section Program Review, January 2007,” states that “virtually no forestry or agriculture issues are being addressed” in the DFO BC Interior office, and at that time, its staff were no longer attending district or regional forestry meetings.⁵⁰⁴

DFO does not have a fish-forestry person working out of its regional headquarters as it had until the early 2000s; Mr. Delaney also said that, by the mid-2000s, the priority placed on the fish-forestry file had decreased.⁵⁰⁵ At one time, DFO had a fish-forestry technical working group, but this “fell apart in about 2006, 2007.”⁵⁰⁶ There is no viable referral system or standard way for DFO to communicate with forest licensees or the province.⁵⁰⁷ According to Mr. Delaney, DFO is not doing referral work on forestry because logging plans are not referred to it and/or these plans are not a priority for field staff given other demands on their time.⁵⁰⁸ Mr. Delaney could not say whether the withdrawal of DFO on forestry issues had affected the health of Fraser River sockeye salmon.⁵⁰⁹

DFO has also become less involved with the research and monitoring of fish-forestry interactions, although some close connections remain between DFO and provincial scientists, and DFO Habitat Management Program staff have done some monitoring of stream crossings.⁵¹⁰ DFO has no active fish-forestry research under way, and DFO research funds in this area have dried up.⁵¹¹ DFO does not undertake any of its own field assessments on streamside retention zones.⁵¹²

Finally, Mr. Delaney told me that DFO has little, if anything, in the way of broad-scale level (as opposed to local level) work with First Nations or environmental organizations on forestry activities and protection of fish habitat. He added that monitoring is an area of potential partnership with First Nations or environmental organizations at the local level.⁵¹³ Mr. Delaney described a number of reasons for this disengagement by DFO on fish-forestry issues: DFO's move to a results-based professional reliance model, which has resulted in not as many referrals coming to DFO to review; the EPMP streamlining processes; reductions in staff; and an increase in development activities.⁵¹⁴

Mountain pine beetle

The mountain pine beetle epidemic increased significantly after 1997, peaked in 2007, and then began to decline in 2008. On average, mountain pine beetle attacked 99,600 hectares of forested pine per year from 1962 to 1997, and 4.5 million hectares per year from 1998 to 2008. From 2003 to 2007, approximately 88–95 percent of the annual mountain pine beetle infestation occurred in the Fraser River basin. Within the Fraser River basin, the regions of Cariboo-Chilcotin (at 49–51 percent infested) and the Upper Fraser (at 37–44 percent infested) experienced the greatest impact.⁵¹⁵

In response to the mountain pine beetle epidemic, MFLNRO increased the allowable harvest levels in order to salvage the pine before the trees rotted in place. In August 2004, OHEB's BC Interior acting area chief wrote to the chief forester about the increase in allowable annual cut, stating DFO's support for a precautionary management approach due to the uncertainties surrounding the mountain pine beetle epidemic. Specifically, it recommended the following management actions:

- implementation and monitoring of watershed assessment procedures (provided in the Coastal / Interior Watershed Assessment Procedure Guidebook);
- protection of streamside and riparian areas as provided for by the Code and RMA Guidebook;
- protection of streams not provided for in the Code or RMA Guidebook;

- development of indicator basins for long-term monitoring to assist in management decisions; and
- inclusion of academics and the community in developing and carrying out monitoring programs.⁵¹⁶

The March 2007 report of the Forest Practices Board noted that FRPA fails to require landscape-level watershed assessments or planning for most mountain pine beetle-affected watersheds and found that government needs to develop policy and strategies to protect fish habitat in such watersheds:

[M]ore consideration of the hydrological effects of [mountain pine beetle] is needed operationally. Priorities should include watershed planning, harvest scheduling, riparian retention, and assessment of the adequacy of drainage structures.⁵¹⁷

Later in 2007, a presentation to DFO's Pacific Region Strategic Directions Committee (for a description of this committee, see Chapter 4, DFO overview) highlighted the need for DFO to consider seriously its role in mountain pine beetle management. The presentation noted the following key issues: the lack of DFO involvement; the lack of federal priorities to address the mountain pine beetle issue in a manner that provides for the protection of fish and water resources; and the importance of the latter, given the provincial approach does not focus on protecting water quality, preserving fish habitat, or preventing flooding.⁵¹⁸

In December 2007, the DFO minister's office directed the Pacific Region to develop a "coordinated approach to salmon sustainability and to begin discussions related to a briefing of federal ministers around horizontal coordination on pine beetle and watershed management." In 2008, DFO's key science advice regarding mountain pine beetle was to leave riparian buffers and implement the "precautionary principle."⁵¹⁹ In 2009, MFLNRO scientists recommended a 10 m buffer for small streams in mountain pine beetle salvage areas.⁵²⁰ This recommendation has not been implemented.⁵²¹

Given what is unknown about the effects of the mountain pine beetle on fish-forestry interactions in the future, Dr. Tschapinski recommended

researching large-scale, clear-cutting impacts on fishery values.⁵²²

Log storage / handling on the Fraser River estuary

Log handling refers to the “[e]stablishment and operation of aquatic and terrestrial areas used for storing and sorting logs and includes log sorts at pulp mills and sawmills and underwater log salvage.” Operations include the initial transfer of logs to water, sorting, booming, barging, transport, and storage. Because of the terrain, coastline, and economic realities of moving wood products in British Columbia, log-handling operations are often situated in (or near) marine or freshwater. In fact, most coastal forest tenures are log-handling facilities; however, only parts of these sites operate at any one time.⁵²³

Current log-handling site selection and operational procedures are regulated by a number of federal and provincial acts. Guidelines developed in 2003 for DFO direct operations into “steep and deep” areas and away from highly productive intertidal and shallow sub-tidal areas. These guidelines aim to assist proponents and regulatory agency personnel in meeting relevant log-handling environmental legislation. They describe best management practices for siting and design of log-handling facilities and log-transfer activities, as well as the design, orientation, construction materials, and chemical treatments of wharves, docks, piers, and floats, and the design of dry-land sort facilities.⁵²⁴

In 2009, DFO collaborated with the BC Coastal Forest Product Association to develop best management practices for log-handling activities, which aim to streamline DFO regulatory reviews of low-risk activities related to log handling. Relevant best management practices include helicopter log drop sites in marine waters of British Columbia and re-activated log dumps in marine waters of British Columbia. Also available is a land-use operational policy on log handling produced by the province.⁵²⁵

I heard some evidence that disturbance because of log storage on the Fraser River estuary has the potential to affect Fraser River sockeye.⁵²⁶ Technical Report 3, Freshwater Ecology, looked at data describing the extent of log storage in the

Fraser River estuary as well as a time series of aerial photos in order to assess the potential impact of this activity on Fraser River sockeye. For discussion of the evidence on this with respect to impacts on Fraser River sockeye, see Volume 2 of this Report.

Findings

Riparian areas

Riparian areas are important for Fraser River sockeye salmon. Loss or degradation of riparian habitat poses risks to Fraser River sockeye sustainability.

Under the *Riparian Areas Regulation* (RAR), a proponent must have an assessment report completed by a qualified environmental professional (QEP) before development may be approved or allowed by local governments. The provincial Ministry of Environment started compliance monitoring for the RAR and is developing an effectiveness monitoring plan, although at the time of the hearings in June 2011, the time frame for developing this plan was uncertain. The Department of Fisheries and Oceans (DFO) is not engaged formally in RAR monitoring although it participates on an opportunistic basis. Provincial compliance monitoring in relation to the RAR is broken into three components: QEP, local government, and developer compliance. DFO and the ministry agreed on a RAR compliance target of 90 percent compliance with 90 percent confidence.

Although the province has taken some positive steps toward auditing QEP assessments under the RAR, the evidence raises questions about whether this professional reliance model achieves the purposes for which it was developed. Specifically, I heard that almost half the incidents of non-compliance with the regulation were because of errors by QEPs and I heard concerns about the amount of discretion they have in the assessment process. The ministry notified QEPs of the results of its review, and if the errors were considered a serious concern, then the ministry had “more serious discussions with” the QEP and his or her professional association. The QEP training course was also improved based on some of the compliance information collected, although this course is not mandatory for QEPs. I also heard that local government and developer compliance with the

regulation is low. Only 60 percent of local governments were found to be compliant, meaning that 40 percent did not have the appropriate bylaws in place to trigger regulatory action under the RAR. Developer compliance was 38 percent on Vancouver Island and 48 percent on the mainland. By the time of the hearings, no compliance reports had been completed since 2009 and no changes to the RAR were made on the basis of compliance reporting results. I heard no evidence that anything other than the compliance assessments and the actions taken by the ministry in relation to QEP reports, has been done to ensure achievement of the RAR compliance target of 90 percent with 90 percent confidence.

Until recently, if a proponent sought to vary the streamside protection and enhancement area recommended in a QEP's assessment report, the provincial Ministry of Environment would notify DFO, and DFO would be responsible for approving the application for a variance. However, as a result of the decision of the BC Court of Appeal in *Yanke v. Salmon Arm (City)*, developments that require variances to the streamside protection and enhancement area, but that do not result in harmful alteration, disruption, or destruction of fish habitat (HADD), do not require approval by DFO or the Ministry of Environment. The court ruled that there is nothing in section 4 of the RAR that allows DFO to veto a development proposal that is before a local government where the QEP has given an opinion that the proposed development will not result in a HADD. I am concerned that DFO may have no proactive input into the development process, even though it is responsible for the protection of fish habitat and has extensive experience in this issue. It is left with only the reactive, and rather blunt, instrument of section 35 of the *Fisheries Act*.

I find the key benefits of the RAR are: the explicit requirement for local governments covered by the regulations to have riparian protection in their bylaws; the ability to protect previously disturbed habitat, as well as pristine habitat; and the identification of streamside enhancement as well as protection, so the regulation promotes restoration or recovery and not just protection of existing habitat as under section 35 of the *Fisheries Act*. Critical deficiencies of the RAR include: it does not apply to all areas of the Fraser

River watershed; QEPs have too much discretion; it does not require follow-up by the municipalities to ensure that the measures required in the assessment reports are implemented; and there is no enforcement mechanism to ensure compliance with the regulation.

I accept the evidence that there is a regulatory gap in protection for some riparian areas. Lands adjacent to water courses may be privately owned, but in the case of lakes, private ownership applies only above the high-water mark. The provincial *Water Act* controls works "in and around streams," but I understand that the province interprets this phrase to extend only up to the high-water mark. Thus, works above the high-water mark are not regulated under the *Water Act*. The RAR only applies above the one-in-five-year flood elevation, which is higher than the high-water mark. Thus, there is a physical gap between the high-water level (the *Water Act* limit) and the one-in-five-year level (the RAR level), and works undertaken in this area are subject to no provincial regulatory control.

Finally, I heard unanimous testimony from DFO and the province that the Shuswap Lake Integrated Planning Process is a good process that allows agencies from all levels of government, as well as First Nations and stakeholders, to focus on the habitat management of Shuswap Lake. At the time of the hearings, however, there was no secured funding for the initiative.

Water use

I accept the evidence of Jason Hwang, area manager, Oceans, Habitat and Enhancement Branch (OHEB), BC Interior, that the *Fisheries Act* is generally not enforced against water users and that federal regulatory tools are limited and not particularly well-suited to managing water use for the benefit of fish. Given that conclusion, the province's role in the regulation of water use in the Fraser River is important. I find the following potentially harmful to Fraser sockeye:

- the lack of regulation of groundwater;
- the lack of a requirement for the comptroller or regional water manager to consider instream flows and fisheries impacts when making licensing decisions; and

- the inability of the comptroller or regional water manager to restrict water use for the purpose of protecting fish.

Given these findings, I acknowledge and laud the efforts of the province with respect to *Water Act* modernization. In its final submissions, Canada also indicated that it supports the province's efforts to modernize the provincial *Water Act*.⁵²⁷

With respect to hydroelectric power projects, I conclude that the development of water use plans for BC Hydro power projects has been beneficial to the protection of sockeye habitat. I find that, as Dr. Steve MacDonald, research scientist and head, Environmental and Aquaculture Research Section, DFO, testified, the Summer Temperature Management Program is an effective strategy to protect Fraser River sockeye. The evidence regarding independent power projects does not indicate that there are negative impacts on Fraser River sockeye at this time; however, I note the concern expressed by Dr. Craig Orr, executive director, Watershed Watch Salmon Society, about the lack of public input into siting and water flow guidelines for these projects.

Gravel removal

I accept the evidence from both experts who testified on this subject, Dr. Laura Rempel, habitat biologist, OHEB, and Dr. Marvin Rosenau, instructor, Fish, Wildlife and Recreation Technology, British Columbia Institute of Technology, that there are gaps in the data with respect to sockeye and the gravel reach habitat, and I note that DFO is aware of the need for long-term planning, comprehensive monitoring on a reach-wide scale, and adequate habitat compensation from the proponent. I encourage DFO to consider supporting research on the annual pattern of fish activities within the gravel reach, including research directed at developing a better understanding of the spatial and temporal distribution of river-type sockeye in the gravel reach, habitat characteristics that river-type juvenile sockeye depend on, and the overall importance of these habitats to those fish. But, I am cognizant of that fact that DFO must prioritize its research, and I do not find myself compelled by the evidence to recommend prioritizing research on sockeye salmon over other species that may be

more threatened by gravel removal in the Lower Fraser River.

Forestry

I find that DFO has decreased its role in fish-forestry interactions and forestry-related reviews. Since the early 2000s, DFO has not had a fish-forestry person working out of its regional headquarters, and in about 2006, its Fish-Forestry Technical Working Group (a regional forum to communicate and discuss fish-forestry interaction issues, make recommendations to senior management, and facilitate communication between area Habitat Management Program staff and regional headquarters) was disbanded. There is no viable referral system or standard way for DFO to communicate with forest licensees or the province. According to Peter Delaney, senior program advisor, OHEB, DFO is not doing referral work on forestry because logging plans are not referred to it and/or they are not a priority for field staff given other demands on their time.

As well, DFO has also become less involved with the research and monitoring of fish-forestry interactions, although some close connections remain between DFO and provincial scientists, and DFO Habitat Management Program staff have done some monitoring of stream crossings. DFO has no active fish-forestry research under way, and DFO research funds are no longer directed to this area. DFO does not undertake any of its own field assessments on streamside retention zones. With respect to mountain pine beetle management, I agree with DFO's view of the need for a precautionary management approach, including leaving riparian buffers.

To the extent that I make recommendations in these areas, I discuss these findings in Volume 3 of this Report.

■ Marine habitat

In this section I summarize the evidence on several topics specific to the marine environment: the marine spill response process; DFO's management of marine science issues relevant to Fraser River sockeye salmon (including Fraser River sockeye marine survival research, marine climate change research, and harmful algal blooms); oceans management; and the Disposal at Sea program.

Marine spill response process

The federal government has primary responsibility for regulating pollution originating at sea (marine-based pollution).⁵²⁸ The provinces are responsible for regulating many aspects of land-based pollution, but the federal government also plays a role in regulating the latter under the *Fisheries Act* in relation to fish habitat (section 36 and associated regulations deal with specific industries such as pulp and paper and metal mining).

The *Canadian Environmental Protection Act, 1999* (CEPA), addresses pollution.⁵²⁹ The Act aims to protect the environment and human health by managing marine pollution, disposal at sea, toxic substances, and other sources of pollution. Land-based sources of marine pollution are addressed under CEPA Part 7 (Controlling Pollution and Managing Wastes), Division 2 (Protection of the Marine Environment from Land-based Sources of Pollution). The term “land-based sources” in CEPA Part 7, Division 2, means “point and diffuse sources on land from which substances or energy reach the sea by water, through the air or directly from the coast.”⁵³⁰ “Marine pollution” in Part 7 is “the introduction by humans, directly or indirectly, of substances or energy into the sea that results, or is likely to result, in (a) hazards to human health; (b) harm to living resources or marine ecosystems; (c) damage to amenities; or (d) interference with other legitimate uses of the sea.”

The provincial *Environmental Management Act* governs environmental protection and management in British Columbia, including effluents introduced to the environment from point sources such as wastewater treatment plants, pulp mills, and mines.⁵³¹ The primary provision governing the disposal of waste into the environment is section 6 and the *Waste Discharge Regulation*.⁵³²

The *Fisheries Act*, CEPA, and the provincial *Environmental Management Act* are described in Chapter 3, Legal framework.

Regulatory roles

Transport Canada is the lead regulatory agency for all ship-source spills. It also manages the National Aerial Surveillance Program, approves ship-source pollution prevention and response plans on large commercial vessels, approves oil handling facility

response plans, certifies response organizations, monitors their activities and exercises, maintains the Pollutants List, and is responsible for enforcement and compliance with the *Canada Shipping Act* (CSA).⁵³³ Transport Canada is responsible for administering most regulations under the *Canada Shipping Act*.

The Department of National Defence (DND) is responsible for marine spill response, including cleanup and monitoring, from DND ships and facilities.⁵³⁴ All spills are handled under DND Environmental Directive ED 4003-1/2003 (ED 4003-1), which is specific to DND's Maritime Forces Pacific (MARPAF), and under local policies and procedures such as the Formation Safety Environment System Manual. DND determines whether the spill is a deleterious substance on a site-specific and incident-specific basis and, if so determined, DND reports the spill to the Provincial Emergency Program, which in turn reports spills to Environment Canada and DFO.

Environment Canada, and in particular its Environmental Emergencies Program, is the lead agency for land-based spills into the marine environment from federal facilities and lands. For other land-based spills, the province, through the Provincial Emergency Program, is the lead agency, and Environment Canada provides environmental advice and support.⁵³⁵ A 1981 agreement between Canada and British Columbia determines whether Environment Canada or the province will be the lead agency for land-based spills.

The Canadian Coast Guard (Coast Guard) is the lead federal agency responsible for ship-source and mystery-source pollution incidents in Canadian waters, which include all waters out to the exclusive economic zone (that is, the 200 nautical mile limit) and internal waters including lakes and rivers. The legislative mandate for this responsibility arises primarily from section 180 of the CSA and section 41 of the *Oceans Act*. The Coast Guard is a special operating agency within DFO; the commissioner of the Coast Guard reports to the deputy minister of DFO.⁵³⁶

The Coast Guard has a Marine Spills Contingency Plan with national, regional, and area chapters.⁵³⁷ The role of the Coast Guard is twofold: (1) overseeing a polluter's response to a marine pollution incident;⁵³⁸ or (2) if the polluter is unknown or unable to respond, managing the response to the incident.⁵³⁹ Once the

Coast Guard assumes management of the response to a pollution incident, its on-scene commander initiates a response in one of five categories. The level of response depends on either the type of incident or the type of response that the incident requires and is not necessarily related to the severity of the incident.⁵⁴⁰

The Coast Guard does not consider the evaluation of habitat impacts as its mandate. Rather, it relies on Environment Canada and DFO to determine long-term habitat impacts.⁵⁴¹ Sergio Di Franco, senior enforcement and prevention officer, Environmental Response Branch, Coast Guard, testified that the Coast Guard brings a variety of expertise to marine pollution incidents and environmental response: operational, response management; technical, logistical, and public relations experience; as well as experience dealing with polluters. He noted advantages to the Coast Guard's role as the first responder, including the Coast Guard's organizational structure, staffing, response equipment depot sites, vessel support, logistical support, air support, and liaison experience with other government agencies.⁵⁴²

The Regional Environmental Emergency Team

According to Mr. Di Franco, the Regional Environmental Emergency Team (REET) is the group that develops monitoring plans for habitat issues and conducts long-term monitoring of a particular site. It is a body of experts that provides technical, scientific, and environmental advice to the Coast Guard and is chaired by Environment Canada and the province (Ministry of Environment). A REET is not convened for the majority of marine pollution incidents, where the Coast Guard has determined that these are small discharges of oil that disperse quickly, there are no major resources at risk, and/or no impacts are noted.⁵⁴³

Upon receiving a call about a marine pollution incident, the Coast Guard will do an assessment, and, if it determines further information is required, it will call Environment Canada to activate a REET. A REET can also self-activate if Environment Canada feels it is necessary to have a REET to deal with a certain incident. Mr. Di Franco explained that, in determining whether a REET is required for a marine spill, the Coast Guard does not generally talk with non-Coast Guard DFO, but it talks with the

Environment Canada chair and provincial co-chair of the REET. The Coast Guard assesses whether a REET is required based on visual observations of the spill site (including verification that an incident has occurred, identifying a source for the pollution, and identifying the resources at risk). The Coast Guard Marine Spills Contingency Plan outlines the steps to be taken during this assessment. Mr. Di Franco testified that the Coast Guard person who makes this assessment (the environmental response duty officer) may not understand the short- and long-term impacts on fish and fish habitat from oil spills.⁵⁴⁴

The Coast Guard relies on the REET for advice about impacts on anadromous fish and fish habitat in the marine environment. The Environment Canada chair of the REET determines the agencies that should participate in the REET to determine these impacts.⁵⁴⁵ Bruce Reid, former (2007–9) regional manager of Habitat Protection and Sustainable Development, OHEB, and, at the time of the hearings, regional manager, Oceans Program, OHEB, said that, in his experience, the chair of the REET seeks advice from DFO on impacts related to anadromous fish and fish habitat and DFO provides this advice.⁵⁴⁶

The REET is only an advisory organization, and the Coast Guard can choose to ignore its advice.⁵⁴⁷ Whether the Coast Guard follows the REET's advice depends on a variety of factors and circumstances. Mr. Di Franco testified that “[g]enerally, the Coast Guard does accept REET's advice, but the information that is provided by REET is just one component of the overall response plan.”⁵⁴⁸ However, Dr. Peter Ross, research scientist, Marine Environmental Quality Section, Institute of Ocean Sciences, Science Branch, testified that, in his experience, the Coast Guard ignored the REET's advice.⁵⁴⁹

In deciding whether to follow advice from the REET, Mr. Di Franco listed a number of things to be considered: worker safety issues, public safety issues, nature of the product spilled, weather conditions, forecast conditions, tide information, and cost and reasonableness of the monitoring. The Coast Guard can also take into account information sheets or standards from international science organizations. Even if the Coast Guard had advice from DFO Science particular to the spill at issue, this specific science advice may not take precedence over the international information sheets. Similarly, the Coast Guard may prefer the approach

of the polluter or cleanup company over the advice of the REET.⁵⁵⁰

Mr. Di Franco stated that any action taken by a polluter or the Coast Guard has to “pass the test of reasonableness.” Elaborating on this criterion, he said, “[T]he actions have to be reasonable in that we cannot implement any action or response action that is too costly and above and beyond what a reasonable person would implement.” He explained that this is because the Coast Guard always tries to recover its costs for marine spill response from the polluter, its insurance company, or the Ship Source Oil Pollution Fund. When a claim is submitted to one of these three, the Coast Guard has to demonstrate reasonableness or it will not recover its monitoring or response costs. This demonstration involves a cost-benefit analysis to help determine if an action is “reasonable.”⁵⁵¹

The Coast Guard on-scene commander or federal monitoring officer (that is, the Coast Guard representative at the spill) normally makes the decision as to what is reasonable, but he or she can consult with Coast Guard staff, even up to the associate deputy minister or minister level, as needed.⁵⁵² Guidelines to assist in the selection of an appropriate on-scene commander or federal monitoring officer are the same and are set out in Coast Guard directives.⁵⁵³ One of the items listed is “the ability to identify the public’s interests and priorities.” When asked how that quality is determined, Mr. Di Franco did not answer but stated that identifying the public’s interests and priorities is mainly conducted through a local liaison officer and this person would communicate his or her assessment of the public’s interests, priorities, and concerns to the on-scene commander.⁵⁵⁴

Sampling and monitoring of marine pollution incidents

The collection of samples or monitoring of a spill is specified in a monitoring plan for the spill. According to the Coast Guard, if a polluter is willing and able to respond to a spill, then the polluter is the one who develops the monitoring plan, and the plan is given to the Coast Guard and the REET (if one is convened) for review and comment. If any changes or amendments to the monitoring plan are required, then the Coast Guard will ensure that the polluter makes those amendments. If it is a mystery

spill or if the polluter is unable to respond and produce a monitoring plan, then it is the REET’s responsibility (again, if one is convened) to develop the monitoring plan.⁵⁵⁵

Ensuring that monitoring plans are implemented as described in the plan is the responsibility of the Coast Guard. Results of the monitoring go to the Coast Guard and to the REET, if a REET is convened.⁵⁵⁶

Dr. Ross said that understanding and mitigating impacts to natural resources requires scientific knowledge, active scientific investigation, and sample collections.⁵⁵⁷ Mr. Reid agreed that monitoring programs are highly scientific and require experienced knowledge of what to sample, how to sample, where to sample, etc.⁵⁵⁸ The list of competencies for on-scene commander or federal monitoring officer does not include these requirements.⁵⁵⁹

Dr. Ross expressed concern about whether the Coast Guard is the best decision maker for marine spill mitigation and monitoring. His concern stems primarily from his experience with a spill off Robson Bight in 2007. Initially, he was frustrated that the REET members did not have any fish or fish habitat expertise, although a DFO biologist from a local area office was eventually brought in. DFO Science provided advice through the REET regarding immediate steps to take to mitigate the effects, and the Coast Guard acted quickly on this advice.⁵⁶⁰ However, the Coast Guard did not accept the REET’s advice regarding the longer-term monitoring plan. Instead, it followed a US National Oceanic and Atmospheric Administration (NOAA) fact sheet on small diesel spills.⁵⁶¹ In a 2007 email chain, Dr. Ross expressed his frustration with this decision, and he elaborated on this reaction at the hearings:

Yeah, I think what we’re seeing here is a little bit of frustration on my part and of course, this was an email which is now very much in the public light, but you know, the frustration was a personal and professional one. I was involved in this REET, and on the call, one of the things that is not captured here is that on the call, First Nations were very upset and very concerned about diesel getting into some of their local clam beds, which was happening. And I had suggested, on the calls, that we collect shellfish samples and, potentially, water samples, to conduct hydrocarbon measure-

ments. And we did have enforcement officials, Conservation Protection had a team of two on scene, they were able to collect samples, but they were instructed not to, despite having volunteered to do that. And I guess, you know, in terms of what had happened, as I recall, there were concerns expressed on a conference call by Coast Guard that LeRoy Trucking Company did not have the funds to carry out some of these monitoring efforts.

Now, being sensitive to that because, as a scientist, I know how difficult it is to raise money for research, and I know how expensive these analyses can be, I understood where that came from. At the same time, I was frustrated that as a scientist, with no budget and no capacity to follow my own recommendations, I was frustrated that nobody else was seemingly in a position to be able to fund some of these things which I considered to be an important part of making sure that the food supply, traditional food supply of local First Nations was safe, that killer whales were protected, and that we were really understanding where these different types of hydrocarbons were going in that local environment over time.⁵⁶²

Despite having advice from local experts, the Coast Guard decided to rely on a one-page fact sheet from NOAA relevant to only one of the substances of concern in the spill.⁵⁶³

Although Mr. Di Franco did not make the decision for the Coast Guard on the Robson Bight monitoring plan, he explained his understanding about the Coast Guard's considerations in deciding not to follow the REET's advice on monitoring: there were no reports of impact on birds or marine mammal fatalities attributed to the spill, and the area where the incident occurred is a heavy marine traffic area where discharges of diesel or other oils occur on occasion, and so it was not reasonable to monitor until no detectable hydrocarbons were found in the area. Also, the Coast Guard concluded, based on the amount of oil observed at the time and the depth of the ocean, that the majority of diesel had escaped during the sinking of the tanker truck, and according to an engineering study at the time, the Coast Guard was advised that whatever amount of diesel was left on the bottom would probably seep out of the truck over a long period of time and

would be undetectable. Mr. Di Franco testified that he thought the initial response to the incident was handled adequately based on the fact that there was very little diesel at the surface, the depth of the tanker truck was 350 m, the majority of diesel escaped at the onset of the incident, and, six or seven weeks after the incident, there were no reports of seepage coming from the truck. (Later it was found that the tank was intact with at least 3,000 L of diesel still in it.) Eventually, DFO and the province decided to bring the truck up from the bottom, against the Coast Guard's recommendation. Mr. Di Franco said this was not a reasonable response because the Ship Source Oil Pollution Fund did not think that it was a reasonable operation.⁵⁶⁴

In response to the more general question of whether the Coast Guard is the appropriate agency to determine monitoring and mitigation plans to protect anadromous fish and fish habitat, Mr. Di Franco responded that the Coast Guard does not have the expertise to develop the monitoring plans and that is why it relies on the REET's expertise to develop them or to review the polluter's plan.⁵⁶⁵ He did not say how the Coast Guard could fulfill this responsibility when a REET is not convened.

DFO Science's and OHEB's role in marine pollution incidents

There is no requirement that DFO Science or OHEB be represented on the REET. The Environment Canada chair decides who will be brought in depending on the issues to be dealt with.⁵⁶⁶ Both Dr. Ross and Mr. Reid said that, if DFO does not have a strong presence on the REET, then fish and fish habitat are unlikely to be properly identified, protected, assessed, and monitored.⁵⁶⁷

In 2007, there was a spill in Burrard Inlet from the Kinder Morgan fuel line. Because it was a land-based spill, the province was responsible for managing the spill response rather than the Coast Guard.⁵⁶⁸ Coincidentally, Dr. Ross was in the area doing field work when the spill happened. Based on what he saw, he had concerns for anadromous fish and fish habitat. However, there was no avenue for him to provide direct science advice to the REET; he could only do so through OHEB, which was represented on the REET.⁵⁶⁹ Based on the response to the Kinder Morgan spill, some DFO staff argued that DFO's role during major pollution events needed

to be clarified. If Environment Canada, as the chair of REET, decides to bring in DFO, it contacts the appropriate area director, who then contacts an OHEB area chief (or area manager), who in turn contacts an area biologist. However, according to Dr. Ross and Mr. Salomi, OHEB area biologists are not familiar enough with oil or chemical spill impacts, contaminants, or cleanup techniques to give practical or effective support to the REET.⁵⁷⁰

Dr. Ross said it is important to consult scientists who are experts in the field so that they can provide advice, recommend sampling and monitoring, and help guide mitigation efforts or cleanup. He also said that, if samples are not collected under the guidance of scientific researchers who are experts in the collection and selection of samples and the design of follow-up studies, then prosecutions or attempts to make the polluter pay are impaired.⁵⁷¹ Mr. Reid testified that DFO has considerable knowledge and expertise in the biology, ecology, and habitat requirements of anadromous fish and fish habitat, and so in the event of a spill he would expect that DFO's advice would be important.⁵⁷² There is no one person at DFO who coordinates the DFO response to a spill.⁵⁷³ Mr. Reid said that there would be benefits to having such a person in a coordinating role.⁵⁷⁴ Currently there are director-level discussions between DFO and Environment Canada to confirm the role of DFO on the REET.⁵⁷⁵ Dr. Ross said that there should be a formalized role for the provision of DFO Science and/or OHEB advice on spill impacts to the Coast Guard,⁵⁷⁶ and the Coast Guard should not ignore this advice.⁵⁷⁷

DFO management of marine science issues

DFO requires adequate scientific advice to enable it to appropriately manage Fraser River sockeye in the marine environment. One factor that affects the ability of DFO Science to provide advice to managers is access to research vessels. Robin Brown, head, Ocean Sciences Division, Institute of Ocean Sciences, Science Branch, provided a summary of how many days each of the major DFO research vessels were used each year by DFO Science and other users.⁵⁷⁸ The amount of funding has gone up between 2004/5 and 2011/12, but the number of days of research usage on oceanographic vessels

has gone down by about 100 days because the costs have increased faster than the rate of inflation.⁵⁷⁹

DFO's management of three research topic areas relevant to Fraser River sockeye is discussed below.

Fraser River sockeye marine survival research

All the expert witnesses who testified about marine science issues agreed that there are large gaps in our understanding of the marine environment and what may be affecting survival of Fraser River sockeye salmon; they all recommended that DFO work on identifying stressors affecting marine survival of Fraser River sockeye.⁵⁸⁰

Dr. Laura Richards, regional director, Science Branch, Pacific Region, was not able to point to any specific research to address marine survival of Fraser River sockeye. She said that no work has been done to understand the timing of Fraser River sockeye salmon stocks into the Strait of Georgia during their outmigration, although she said that there is research more broadly directed at juvenile salmonids in the Strait of Georgia. She further noted that there is no work being done to understand which Fraser River sockeye stocks migrate along the west coast of Vancouver Island as opposed to up through Johnstone Strait and that there is no directed DFO research being done on the life history of Harrison River sockeye. With respect to Harrison sockeye, DFO does not intend to do this work directly, but it would do it in "conjunction with a broader project that would be looking at all salmonids in the Strait of Georgia."⁵⁸¹ Similarly, DFO is not looking at where Fraser River sockeye may go after they leave the north end of Vancouver Island, although some research is being done in this area and further north on salmonids generally. With respect to where Fraser River sockeye stocks reside in their first year of marine life and their marine distribution, Dr. Richards said:

I think the studies that I just mentioned again will give us some of that information ... indirectly. But we will be trying to get information on that. We'll also be getting information on their growth. And from the repeated samples we may be able to infer some information on survival, though that's a little less clear. But we will be

looking at all of the information that we get from those, including the stock composition.⁵⁸²

She went on to say that, from a scientific perspective, DFO's lack of knowledge on the precise migratory routes of sockeye has been an "obstacle." DFO is "very interested in trying to understand more explicitly the impacts of certain oceanographic conditions"; to do that it needs to know exactly where sockeye are in the ocean. Dr. Richards explained that, in terms of setting priorities for marine research, she considers advice from DFO scientists, but she has to take this advice in conjunction with management questions that are being asked. In relation to DFO Science's current marine research priorities, she said that a lot of the work is focused on long-term monitoring such as trawl surveys, oceanographic data, and stock assessment.⁵⁸³

I note, however, DFO's Ecosystem Research Initiative focused on the Strait of Georgia.⁵⁸⁴ It has three principal goals:

- 1 understanding how this ecosystem works;
- 2 identifying drivers of change most likely to determine future conditions; and
- 3 analyzing future responses of the system under these influences.⁵⁸⁵

The Strait of Georgia Ecosystem Research Initiative could provide information about Fraser River sockeye marine survival, and it is discussed briefly in Chapter 4, DFO overview.

Marine climate change research

One of the major challenges faced by Canada is its ability to adjust management policies and practices in an appropriate and timely manner to deal with shifts in fish species distribution and relative abundance as a result of climate change.

DFO's 2011 corporate risk profile states that there is a risk that DFO will be unable to adapt quickly to the effects of climate change.⁵⁸⁶ One of DFO's intended responses to this risk is to develop a "Policy Framework on Climate Change." Mr. Brown testified that this framework has not yet been developed; he did not know if there is a plan to develop it or if there has been any funding allocated to its development. Mr. Brown said no one in the DFO

policy group is taking advice from DFO Science on climate change, as the policy group has only an intermittent interest in these long-term issues. In his view, the policy side of DFO needs to be receptive to advice coming from DFO scientists.⁵⁸⁷

According to Mr. Brown, DFO Science has received funding for climate change work, but this funding has not been consistent. In the early 2000s, DFO Science had some funding under an inter-departmental program run by Natural Resources Canada called the Panel on Energy Research and Development; around this time there were also the Natural Resources Climate Impacts and Adaptation Research Network (which ran until about 2005), Canadian Climate Action Fund, and Action Plan 2000. Mr. Brown said the latter two seemed to be designed as interim programs while a larger Government of Canada framework for working on climate change issues was developed, though he was not sure if this larger framework was ever actually established. The next phase of federal climate change funding was subsequently renamed the "Clean Air Agenda."⁵⁸⁸

DFO has never been considered a lead agency with respect to climate change research in Canada and, in Mr. Brown's view, this negatively affects the funding available to DFO Science for climate change work in the marine environment. He explained that one of the ways DFO understands its priorities is whether funding is allocated to it for an issue. If it is not funded, then DFO takes this as a signal that it is not important. Climate change work within DFO Science does not have much funding, although some specific funding is embedded in the DFO Science Ecosystem Research Initiatives (see below).⁵⁸⁹

The DFO document entitled "Climate Change Risk Assessment Report" (2005) identifies relative risks of climate change in identified categories and sets out suggested responses to ecosystem and fisheries management risks.⁵⁹⁰ The first category is "support and enhance the Science Program," and there are a number of recommendations on how to do so. Mr. Brown explained that any bullet that begins with "enhance" did not get much enhancing, and where it says "support" DFO probably continued to support it. The Science Branch allocated some money to the Climate Change Science Initiative, and this has been combined with some climate change-related research under the Ecosystem

Research Initiative, which in the Pacific Region is focused on the Strait of Georgia. The Climate Change Science Initiative and Ecosystem Research Initiative were introduced as new, funded programs, but, as the net spending within DFO Science did not actually increase much, these programs are essentially a repackaging of funding more than an infusion of new funds.⁵⁹¹

Recommendation 3.25 of the *Fall 2010 Commissioner of the Environment and Sustainable Development Report* states:

Environment Canada, Natural Resources Canada, Health Canada, Fisheries and Oceans Canada, and Indian and Northern Affairs Canada should identify the adaptation measures necessary to respond to the risks that climate change presents for their areas of responsibility.⁵⁹²

But, according to Mr. Brown, there was no new funding to increase work in the areas identified by DFO in its response to this recommendation. Its response to Recommendation 3.25 is simply a description of the work that DFO is currently doing. The 2011 federal budget contained some funding for climate change adaptation and impact research; it is possible that DFO will get some of this money, but the money had not been allocated to departments at the time of the hearings in August 2011, and the program had not yet been designed.⁵⁹³

According to Mr. Brown, there has been “a fair bit” of research on climate change and impacts on fisheries.⁵⁹⁴ Dr. Richards added that DFO has been working with the North Pacific Marine Science Organization (PICES) on a number of studies looking at the effect of climate change in the North Pacific on salmon.⁵⁹⁵

The DFO Climate Change Risk Assessment Report (2005) states that there are three fisheries management-related risks of climate change, which jeopardize DFO’s ability (1) to meet its strategic policy objectives related to oceans management, as well as the sustainable development and integrated management of resources in Canada’s aquatic environment; (2) to manage and protect the abundance, distribution, and quality of harvested fisheries and aquaculture stocks; and (3) to protect species diversity and species at risk. The second risk was ranked first among all risks identified by the report. The report sets out a suggested risk response. When

asked what DFO has done to address the identified risks, Mr. Brown said that not a lot of work has been done other than under the Climate Change Science Initiative and the Ecosystem Research Initiative. In his view, the Climate Change Science Initiative work is relevant generally for Fraser River sockeye, particularly if one is interested in what the future may hold for these stocks.⁵⁹⁶

DFO’s five-year research agenda lists “climate change variability” as a priority research area for DFO and sets out a number of priority research items.⁵⁹⁷ Mr. Brown testified about the work under way on these items:

- 1 *Analyzing climate change projections from the Canadian Centre for Climate Modelling and Analysis coupled carbon-climate model and other international models and developing the next generation models* – This work is under way.
- 2 *Downscaling global climate model projections and interpreting their impact on Canadian waters, including freshwater systems* – This work is also under way, and some of it has been funded under the Climate Change Science Initiative.
- 3 *Analyzing climate change impacts on contaminant pathways* – There has been some continued analysis and interpretation of some existing data, but most of the work has been in the Arctic.
- 4 *Assessing the resilience of aquatic populations, from algae to marine mammals* – The science about how to measure resilience has been slow to emerge, though DFO has set out the following priority items:
 - a study of spatial and temporal variations in life history characteristics of wild populations of key species in different physical and biological environments;
 - b study of key species’ life history characteristic variations and ontogenetic changes in metabolism and potential biological-chemical-physical links related to growth, maturation, and behaviour through experimental work that simulates a variety of environmental conditions;
 - c integration of field and laboratory information into simulations; and
 - d inclusion of impacts of climate change on populations in fishing plans.⁵⁹⁸

Regarding the fourth item, Mr. Brown said some of this work is being done through the Strait of Georgia Ecosystem Research Initiative, but it is long-term work. The Strait of Georgia Ecosystem Research Initiative was to have been completed on March 31, 2012.⁵⁹⁹

Mr. Brown told me that, over the years, “a fair bit” has been done to correlate environmental factors to changes in return migration timing and routes of salmon. However, the year-to-year operations of managing salmon fisheries (that is, work on forecasting, managing catch and escapement, and openings / closings) consumes a lot of DFO’s effort, and much less emphasis has been placed on determining the conditions of the stocks in 20 or 50 years.⁶⁰⁰

Harmful algal blooms

As discussed in Volume 2 of this Report, blooms of toxic algae called “harmful algal blooms” or HABs occur on an annual basis in BC waters, particularly within the Strait of Georgia.⁶⁰¹ They have been found to coincide with the timing of smolts migrating through the Strait of Georgia and may be a contributing cause to the longer-term decline.

DFO Science in the Pacific Region had a harmful algae monitoring program (HAMP) from 1999 to 2004. This program was run out of DFO’s Pacific Biological Station in Nanaimo and was a collaborative effort between DFO and salmon aquaculture companies. Funding was provided by the aquaculture industry, and DFO Science provided in-kind funding through expertise and laboratory and office space. Most of the monitoring sites were either at or near fish farms.⁶⁰²

Since 2004, HAMP has been fully supported by the aquaculture industry and is now housed at Vancouver Island University. The focus continues to be on fish farm-related harmful algae monitoring, management, and mitigation, although some samples are taken in Departure Bay and also in other locations as opportunity arises. Overall, the monitoring program continues to be limited in spatial coverage and only considers surface waters. HAMP’s data are considered proprietary by the aquaculture industry and by HAMP, as the industry now provides all funding for the program.⁶⁰³ HAMP does not release information to the public.

DFO is currently not doing any research or monitoring of HABs.⁶⁰⁴ Mr. Brown testified that, in about 2004–5, the DFO funding for HAB research ran out and DFO interpreted this to mean that the priority for this activity had decreased.⁶⁰⁵ He elaborated on what he thought was the thinking behind the decision not to fund or prioritize HAB research after 2004–5:

And I believe the thinking behind it was the big issues known to be affected by harmful algal blooms were human health through shellfish, and we have quite a mature system in Canada with the Canadian Food Inspection Agency, then losses of fish in net pens, a known issue. DFO, I think, considered it to be primarily industry’s issue to deal with. And impacts on wild fish, not generally considered to be an important issue, perhaps up till this point.⁶⁰⁶

DFO Science’s National Science Directors Committee decided that HABs were not a priority for DFO Science.⁶⁰⁷ Dr. Richards, a member of this committee, explained that the decision was made following funding reductions.⁶⁰⁸

Dr. Jack Rensel, of Rensel Associates Aquatic Science Consultants, testified that there are possible measures that could be explored to reduce the impacts of HABs on wild fish. He also told me that HABs may be a contributing cause to the longer-term decline (see discussion in Volume 2 of this Report).⁶⁰⁹

DFO has not changed the priority assigned to HABs as a result of Dr. Rensel’s work or as a result of a 2010 proposal by Dr. Jim Irvine, research scientist, Salmon and Freshwater Ecosystems, Pacific Biological Station, Science Branch, to establish a monitoring program for HABs, even though DFO has identified Dr. Rensel’s hypothesis as something that the department ought to consider. Dr. Irvine’s proposal for a HAB monitoring program is minimal to moderate in terms of cost.⁶¹⁰ Some costing for a HAB monitoring program is set out in the document “Fraser River Sockeye – Proposed Research Framework Request for Projects.”⁶¹¹

DFO has also not changed the priority assigned to HAB research after a June 2011 briefing note was provided to the deputy minister identifying HABs as a leading hypothesis for the poor 2009 returns (discussed in Volume 2 of this Report).⁶¹² No one at

DFO is responsible for coordinating HAB research or information.⁶¹³ DFO had not decided, as of August 2011, where research would be directed or what funds might be expended on HABs or other hypotheses for the decline.⁶¹⁴ Despite no directed research program, Dr. Richards said that DFO did collect some samples in 2011 in collaboration with HAMP. She added that DFO will try to stay informed about HABs, but that it does not feel that it is necessary for the department to do “absolutely everything” and that there were other priorities for DFO Science.⁶¹⁵

Dr. Rensel testified that on the West Coast there is no sharing of expertise on HABs between US researchers and DFO, since no one at DFO is identified as a HAB specialist and DFO is not represented at US or international HAB meetings.⁶¹⁶ Mr. Brown explained that DFO scientists are not sent to international conferences to attend sessions on things that are deemed low priority.⁶¹⁷ DFO Science staff in the Pacific Region attend the North Pacific Marine Science Organization HAB working group meetings, but staff are there to learn rather than contribute.⁶¹⁸

Dr. Rensel and Mr. Brown made two recommendations regarding management of HABs:

- DFO or some other institution should be researching and monitoring HABs, in particular *Heterosigma*, in the Strait of Georgia.⁶¹⁹
- It would be useful to DFO Science to have HAB fish farm data, and fish farms should share this information with scientists, DFO or otherwise.⁶²⁰

Oceans management

The *Oceans Act* calls for integrated, ecosystem-based management of Canada’s marine regions, grants the minister of fisheries and oceans the power to develop integrated management plans and designate marine protected areas, and requires the minister to lead the development of a national strategy.⁶²¹

The Pacific Region’s Oceans Program has two key focuses: integrated oceans management, and

marine conservation tools, which include marine protected areas and marine parks.⁶²² According to a PowerPoint presentation provided to the Commission by Ms. Reid, on an operational level, the Oceans Program is focused on implementing Canada’s Oceans Strategy⁶²³ through the “Oceans Strategy MOU”^{*} and its related sub-agreements.⁶²⁴ Regionally, the Oceans Program is part of OHEB. The manager of the Oceans Program (as of August 2011, Bruce Reid) reports directly to the regional director of OHEB.⁶²⁵ At the national level, the Science sector is responsible for the Oceans Program.[†]

Integrated coastal and oceans management (“integrated management” or “coastal zone management”) is a management framework that aims to include activities ranging from area-based planning to coastal and marine habitat and biodiversity protection.⁶²⁶ Integrated oceans management involves adopting a spatially based planning and management approach so that ecosystem-scale management objectives may provide guidance to all ocean-related regulators. According to DFO, one of the key requirements for successful integrated oceans management is the “development of plans that include ecological, social and economic objectives.” Marine conservation tools such as marine protected areas support sustainable management of the oceans resource by providing options to secure critical aspects of the ecosystem from harm.⁶²⁷ These elements relate, at least in part, to DFO’s oceans management mandate, as developed in Canada’s Oceans Strategy and Oceans Action Plan.

In accordance with the *Oceans Act*, the minister of fisheries and oceans released Canada’s Oceans Strategy in 2002.⁶²⁸ It is the Government of Canada’s policy statement for the management of estuarine coastal and marine ecosystems; it sets out the policy direction for oceans management in Canada.⁶²⁹

Canada’s Oceans Strategy has three objectives, each with several identified activities:

- 1 *Understanding and protecting the marine environment.* Identified activities:
 - a improved scientific knowledge base for estuarine, coastal, and marine ecosystems;

* The Oceans Strategy MOU was not described at the hearings, but it appears to be the Canada–British Columbia Memorandum of Understanding Respecting the Implementation of Canada’s Oceans Strategy on the Pacific Coast (see PPR 19, p. 56, and Exhibit 654).

† As of June 20, 2011, DFO renamed the Oceans and Science sector the Ecosystems and Oceans Science sector; however, for the purposes of this Report, the sector is referred to as the Science sector.

- b policies and programs aimed at marine pollution prevention; and
 - c conservation and protection of the marine environment.
- 2 *Supporting sustainable economic opportunities.* Identified activities:
- a sectoral measures to improve and support governance and management of marine industries;
 - b new and emerging opportunities for oceans industries and oceans-related coastal development; and
 - c co-operation and coordination to support and promote business development in the oceans sector.
- 3 *Promoting international leadership.* Identified activities:
- a sovereignty and security;
 - b international oceans governance; and
 - c sharing experience, promoting compliance, and building capacity, in particular for developing nations.⁶³⁰

Canada's Oceans Strategy states that understanding the marine environment is predicated on solid science and that science support for oceans management is important for delineating ecosystem boundaries, identifying key ecosystem functions and components, developing predictive models and risk assessment techniques, developing ecosystem-based management objectives, developing performance indicators, and assessing the state of ecosystem health. With respect to protecting the marine environment, Canada's Oceans Strategy states that protection must consider the degradation of the marine environment, including physical alteration and destruction of marine habitat.⁶³¹ The first objective is intended to support the creation of a national network of marine protected areas and the establishment of marine environmental quality guidelines.⁶³² The latter are not yet established.⁶³³

According to Canada's Oceans Strategy, the activities associated with each objective were to be implemented from 2002 to 2006.⁶³⁴ When asked what DFO Science has done under the identified activity of "improved scientific knowledge base for estuarine, coastal and marine ecosystems," Mr. Brown described work in progress on the following:

- 1 *Improve co-operation in the collection, monitoring, and disseminating of information, including the integration of traditional ecological knowledge* – DFO Science has done quite a bit of work on the first part about collection, monitoring, dissemination, and state-of-the-oceans reporting (see item 3 below) through enhancing a state-of-the-oceans reporting system. The work on integrating traditional ecological knowledge has been very limited.
- 2 *Better understand ecosystem dynamics including climate variability and the impact of change on living marine resources, as well as a new orientation toward operational oceanography* – Work has been done on a scientific publication on climate variability, answering some but not all of the questions on ecosystem dynamics, and there has been modest progress on operational oceanography.
- 3 *Promote the development of a state-of-the-oceans reporting system* – See response to item 1 above.
- 4 *Promote academic liaison on oceans research for and among natural and social sciences, especially through the Oceans Management Research Network* – There is a lot of work done in DFO Science with (external) academics. The Oceans Management Research Network is not currently having much influence and has faded from the scene.
- 5 *Strengthen the coordination of ocean science in support of ocean management* – "Quite a bit" has been done by DFO Science for OHEB's Oceans Program.⁶³⁵

The 2005 Oceans Action Plan "serves as the overarching umbrella for coordinating and implementing oceans activities, and as the framework to sustainably develop and manage our oceans."⁶³⁶ It sets out four "Oceans Management Tools" to be used in integrated management planning:

- 1 Ecosystem overview and assessment reports with basic scientific information to guide user-led oceans planning in each integrated management priority area, to inform stakeholder consultations, and to accelerate the production of ecosystem objectives.

The reports are also supposed to address ecosystem components and properties, causality and pressures, land-water interface, and water quality.

- 2 Identification of ecologically significant areas.
- 3 Seabed mapping.
- 4 Development of ecosystem objectives to maintain the biodiversity, productivity, and physical-chemical properties of marine ecosystems and to apply ecosystem-based management approaches in the oceans.⁶³⁷

Regional implementation committees, made up of representatives of federal and provincial governments and Aboriginal organizations, are intended to implement the Oceans Action Plan, with the first focus of implementation being integrated management planning. These committees include the following:

- *The Pacific Region Committee on Ocean Management.* This senior executive forum for the federal and provincial governments oversees implementation of the Canada-British Columbia Memorandum of Understanding Respecting the Implementation of Canada's Oceans Strategy on the Pacific Coast (Oceans Strategy MOU) and elements of the Oceans Action Plan.
- *The Canada-BC Ocean Coordinating Committee (Coordinating Committee).* The Coordinating Committee administers delivery of the Oceans Strategy MOU and the Oceans Action Plan activities. It provides policy and operational advice and direction to respective agencies, departments, and ministries, and coordinates multi-jurisdictional aspects and interests.⁶³⁸

The federal government has created similar coordinating bodies within its own ranks:

- *The Pacific Interdepartmental Oceans Committee.* These regional director general-level representatives are tasked with ensuring collaboration between federal departments on oceans activities in the Pacific Region and developing strategic direction for implementation of the federal oceans agenda on the West Coast.
- *The DFO Pacific Region Managers' Oceans Committee.* This internal DFO committee seeks to ensure communication among DFO

regional directors and branch managers on Pacific Region oceans issues, particularly in relation to the discussions of the Coordinating Committee.⁶³⁹

The Pacific North Coast Integrated Management Area (PNCIMA) is one of five marine regions, known as large ocean management areas, identified in the Oceans Action Plan as priorities for integrated management planning. PNCIMA extends from the Alaska border to northwest Vancouver Island and from the continental shelf in the west to the BC coastline in the east.⁶⁴⁰

In 2008, Canada, the Coastal First Nations, and the North Coast Skeena First Nations Stewardship Society signed a memorandum of understanding (PNCIMA MOU) under which they adopted a governance framework to support the PNCIMA initiative. The province was initially an observer in this process but signed the PNCIMA MOU in 2010, as did the Nanwakolas Council. The parties to the PNCIMA MOU appoint members to the steering committee, which provides strategic direction and executive oversight for the PNCIMA initiative, and to the planning office, which plays a technical and administrative role in the planning process. First Nations coordinate their involvement in PNCIMA through a body called the First Nations Governance Committee, consisting of representatives from the north coast, central coast, Haida Gwaii (Queen Charlotte Islands), and north Vancouver Island. The role of the governance committee is to seek advice from member communities and to represent the values and interests of member communities on the steering committee.⁶⁴¹

Non-parties to the PNCIMA MOU have a role in PNCIMA through a multi-sector advisory body called the Integrated Oceans Advisory Committee. Membership includes representatives from industry (including commercial and recreational fishing, aquaculture, energy, tourism, and transportation), local government, environmental non-governmental organizations, and other interested parties. The Integrated Oceans Advisory Committee provides advice and recommendations to government agencies regarding the planning process and the integrated management plan for PNCIMA.⁶⁴²

Barry Rosenberger, area director, BC Interior, DFO, and Canadian chair of the Fraser River Panel, testified that, although he does not have

in-depth knowledge of PNCIMA, it “is one [governance] model that should be looked at and there are others.”⁶⁴³ Several First Nations witnesses also expressed support for the PNCIMA governance model.⁶⁴⁴ Ross Wilson of the Heiltsuk Nation and a member of the PNCIMA steering committee noted that membership on the committee is limited to federal, provincial, and First Nations governments: “So you’re looking at owners at the tables, not users.”⁶⁴⁵

The Heiltsuk First Nation submits that PNCIMA should be looked at “as a very useful model for how joint management of the Fraser River Sockeye Salmon should be arranged between DFO and First Nations.” This participant states that, because the PNCIMA process allows for involvement of First Nations in the fisheries management process in a manner that recognizes their jurisdiction, it has had a remarkable amount of buy-in from First Nations along the coast.⁶⁴⁶ Another participant, the First Nations Coalition, says that there is value in marine use planning such as that done by the Haida and First Nations of the central coast.⁶⁴⁷ The Commission also received a public submission urging me to recommend that future policy directions should include marine spatial planning elements.⁶⁴⁸

Disposal at Sea Program

Canada is a party to the *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 1972 (London Convention), and the related 1996 *Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, 1972 (1996 Protocol). As such, Canada is obligated to implement a permit system to regulate the disposal of wastes or other matter at sea.⁶⁴⁹ Canada aims to fulfill its international obligations in this regard through Part 7 (Controlling Pollution and Managing Wastes), Division 3 (Disposal at Sea), of the *Canadian Environmental Protection Act*, the purpose of which is to prevent marine pollution, and through Environment Canada’s Disposal at Sea Program.⁶⁵⁰

CEPA prohibits the disposal at sea of material that may be harmful to human health and the marine environment, such as hazardous wastes. Disposal of some substances into the ocean from a ship, aircraft, platform, or other structure is allowed, but only if done in accordance with a Disposal at Sea permit issued by Environment Canada.⁶⁵¹

In British Columbia, material permitted to be disposed of at sea is primarily dredged sediment from river or marine sources or excavated native material from the Metro Vancouver area. Most of what is disposed of at sea by Canada is material dredged to keep shipping channels and harbours clear for navigation and commerce.⁶⁵²

Environment Canada regulates disposal at sea by means of a permit process in accordance with CEPA’s requirements and regulations. Only a small list of wastes or other matter can be considered for Disposal at Sea permits.⁶⁵³ At the time of the hearings, all proposed disposal at sea projects were subject to an environmental assessment by Environment Canada and permit applications may have triggered a *Canadian Environmental Assessment Act* assessment.^{654*}

There are 14 designated disposal sites in British Columbia (see Figure 1.6.4). Disposal site selection criteria under CEPA include proximity to fishery resources and habitat, interference with marine use in the area, evaluation of mixing and transport characteristics at the site, feasibility of monitoring the disposal site, and First Nations concerns.⁶⁵⁵

Environment Canada monitors compliance to ensure Disposal at Sea permit conditions are met. Disposal sites must be reviewed by Environment Canada at regular intervals, taking into account the results of monitoring and the objectives of monitoring programs.⁶⁵⁶ Monitoring results indicate that seabed sediment at BC disposal sites has not been significantly affected by dumping activities.⁶⁵⁷ Environment Canada enforcement officers may also conduct surveillance monitoring and inspections at both loading and disposal sites to ensure compliance with Disposal at Sea permit conditions.⁶⁵⁸

Before issuing permits for disposal in an area where DFO has determined that there is critical habitat under the *Species at Risk Act*,⁶⁵⁹

* Part 3, Division 1, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, enacts a new *Canadian Environmental Assessment Act*, 2012 (CEAA, 2012) and repeals the CEAA. Under the CEAA, 2012, Disposal at Sea permits may no longer require an environmental assessment as they did under CEAA, para. 5(1)(d).

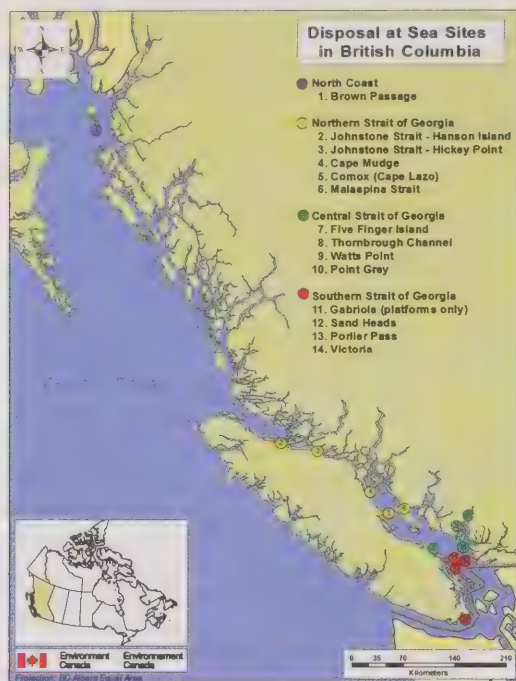


Figure 1.6.4 Disposal at Sea Sites in British Columbia

Source: Policy and Practice Report 19, Marine Environment, p. 39. Reproduced.

Environment Canada consults DFO regarding specific critical habitat requirements to include in the Disposal at Sea permit conditions.⁶⁶⁰

Findings

The evidence before me shows that most marine spills are very small amounts that do not require a spill response. There was no evidence that the failure to assess the impacts of these small spills results in serious harm to salmon or salmon habitat.

The Canadian Coast Guard (Coast Guard) is the lead federal agency responsible for ship-source and mystery-source pollution incidents in Canadian waters. The role of the Coast Guard is twofold: overseeing a polluter's response to a marine pollution incident, or, if the polluter is unknown or unable to respond, managing the response to the incident. The Coast Guard does not see the evaluation of

habitat impacts as within its mandate – it relies on Environment Canada and on the Oceans, Habitat and Enhancement Branch (OHEB) and/or the Science Branch of the Department of Fisheries and Oceans (DFO) to deal with long-term habitat impacts. The Coast Guard receives advice from the Regional Environmental Emergency Team (REET) on impacts on anadromous fish and fish habitat in the marine environment. If a spill is marine in origin, the Environment Canada co-chair of the REET determines what agencies should be brought into the REET to assess any impacts. However, the REET is only an advisory organization, and the Coast Guard can choose to ignore the REET's advice.

The Coast Guard can also prefer the approach to cleanup and monitoring proposed by the polluter or cleanup company over the REET's recommendations. With respect to cost and reasonableness, the Coast Guard tries to recover its costs for marine spill response from the polluter, its insurance company, or the Ship Source Oil Pollution Fund. When a claim is submitted to one of these three sources of funds, the Coast Guard must demonstrate reasonableness or it will not recover its monitoring or response costs.

On the evidence, I am satisfied that the Coast Guard has the organizational structure; staffing; response equipment; vessel, logistical, and air support; and liaison experience to make it an appropriate first responder for marine spills. I also conclude that the REET is the appropriate body to provide advice on monitoring plans and habitat issues.

However, I have several concerns respecting post-emergency mitigation and long-term monitoring of the impacts of marine spills. I accept the evidence of Dr. Peter Ross, research scientist, Marine Environmental Quality Section, Institute of Ocean Sciences, Science Branch, that it is important to have scientists who are experts in the field of contaminants and anadromous fish involved in the marine spill response process to provide advice, recommend sampling and monitoring, and help guide mitigation efforts or cleanup. The current decision maker (the on-scene commander or federal monitoring officer) does not have expertise in long-term habitat monitoring. The Coast Guard is not required to implement the advice of the REET, and there is no mandatory role for DFO Science or OHEB. In my view, responsibility for these matters should be transferred from

the Coast Guard to Environment Canada (where the specialized expertise resides), and assigned to the Environment Canada co-chair of the REET. Membership of the REET should always include OHEB and Science staff, who bring specialized expertise respecting contaminant, fish, and fish habitat issues. Finally, I accept the evidence of Bruce Reid, former regional manager, Habitat Protection and Sustainable Development, OHEB, that it would be beneficial to have one person at DFO responsible for coordinating the department's response to a spill.

In the future, when the Environment Canada co-chair of the REET decides whether to follow the REET's advice respecting post-emergency mitigation and long-term monitoring, he or she should consider impacts on fish and fish habitat, logistics, ecosystem values, cost recovery, and socio-economic impacts.

In its final submissions, the participant Canada told me that it is conducting research on juvenile salmon in the Strait of Georgia and that DFO scientists are doing "considerable" research in other parts of the marine environment.⁶⁶¹ However, the evidence does not support this assertion with respect to Fraser River sockeye salmon. All of the expert witnesses who testified about the marine survival of Fraser River sockeye agreed that there are large gaps in our understanding of the marine environment and what may be affecting survival of these stocks during these life history stages. As discussed further in Volume 2 of this Report, I accept their expert evidence.

I conclude that DFO funding for climate change work, including impacts on fisheries, has been inconsistent and that even research priorities identified in DFO internal risk assessments, its five-year research agenda and five-year research plan, and in the *Fall 2010 Commissioner of the Environment and Sustainable Development Report* are often not fully funded. Canada submits that climate and ocean information are integrated into management through interactions between the Fisheries and Oceanography Working Group and the scientists who create the annual Salmon Stock Outlook document.⁶⁶² However, although the year-to-year operations of managing salmon fisheries such as forecasting and managing catch, escapement, and openings, consumes a lot of DFO's effort, I find that relatively little work has

been done to examine what the conditions of the stocks will be over the long term.

Regarding the management of harmful algal blooms, despite the possible contribution of this stressor to the Fraser River sockeye salmon productivity decline, DFO is no longer involved in the harmful algae monitoring program (HAMP) and, at the time of the hearings, was not doing any research or structure monitoring of harmful algal blooms. Because of this, information and advice about harmful algal blooms may not be available to DFO fisheries managers or scientists. To the extent that DFO requires this information for the management and control of the fishery, it could work with industry and HAMP as well as non-DFO scientists to obtain it.

To the extent that I make recommendations in these areas, I discuss these findings in Volume 3 of the Report.

■ Contaminants

A "contaminant" is a substance that can be detected, and a "pollutant" is a contaminant that has been shown to have an adverse biological effect on the environment.⁶⁶³ Non-point source contaminants are those discharged from diffuse sources, such as runoff from forest management areas, agricultural operations or municipal stormwater, as opposed to contaminants originating from a point source, such as a pulp mill or a metal mine. Contaminants may negatively affect Fraser River sockeye and are a source of concern for members of the public.⁶⁶⁴ In this section, I describe the evidence I heard regarding the management of non-point and point source contaminants.

Non-point source contaminants

Canada regulates contaminants primarily through the *Fisheries Act*, section 36; the *Canadian Environmental Protection Act* (CEPA), section 44 and Part 5; and the *Canada Water Act*.⁶⁶⁵

The minister of fisheries and oceans is ultimately responsible for the implementation of the *Fisheries Act*, including sections 35 and 36. However, while DFO has the administrative lead for section 35, Environment Canada has the administrative lead for section 36.⁶⁶⁶ (For further discussion of the delegation

of section 36 responsibility to Environment Canada, see Chapter 7, Enforcement.)

CEPA, subsection 44(1), directs the minister of the environment to monitor environmental quality, research pollution and contaminants, conduct an inventory of environmental quality data, make pollution prevention plans, and publish information about pollution prevention and environmental quality. Under CEPA, a substance may be designated as a Schedule 1 Toxic Substance.⁶⁶⁷

Under the *Canada Water Act*,* the minister of the environment may co-operate with provinces in managing water quality of federal waters or inter-jurisdictional waters where water quality has become a matter of “urgent national concern.”⁶⁶⁸ Such co-operative agreements shall designate the waters to which they relate as “water quality management areas.”⁶⁶⁹

In addition to legislation, the Canadian Council of Ministers of the Environment has published the *Canadian Environmental Water Quality Guidelines*, a set of ambient environmental guidelines that set levels beyond which adverse effects may be observed. These guidelines include the *Canadian Water Quality Guidelines for the Protection of Aquatic Life*, which establish acceptable levels for toxic chemicals, temperature, and acidity, and the *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life*. The Canadian Council of Ministers of the Environment also developed a Water Quality Index in 1999 as the national indicator of freshwater quality.⁶⁷⁰

The Province of British Columbia publishes Water Quality Objectives, which are physical, chemical, or biological characteristics of water, biota, or sediment that are intended to protect the most sensitive designated water uses. Neither industry nor government is legally required to meet these objectives.⁶⁷¹

Water quality monitoring and Fraser River sockeye salmon

CEPA directs the minister of the environment to establish, operate, and maintain a system for

monitoring environmental quality.⁶⁷² As noted above, the *Canada Water Act* provides for co-operative management of water resources and water quality. Part II of the Act deals with water quality management.

Environment Canada’s Water Science and Technology Directorate (which is part of Environment Canada’s Science and Technology Branch) is the largest freshwater science group in Canada. The directorate conducts aquatic research and monitoring, providing scientific knowledge that supports the development of government policies and programs and public decisions concerning freshwater ecosystems.⁶⁷³ The Aquatic Ecosystem Protection Research Division within the Water Science and Technology Directorate does ecosystem protection research, including research on contaminants.⁶⁷⁴

Environment Canada conducts water quality monitoring in the Fraser River watershed under a memorandum of understanding between Canada and the province (Canada-BC MOU). The Canada-BC MOU lists core parameters (for example, temperature, conductivity, nutrients) that are measured provincially and secondary parameters that might be measured on a site-specific basis (such as some metals and organic pollutants like organochlorines).⁶⁷⁵ Although Environment Canada maintains six water quality monitoring stations, as well as a buoy in the Fraser River estuary, none of these provide information about most contaminants of concern to Fraser River sockeye salmon.⁶⁷⁶ In addition to monitoring done under the Canada-BC MOU, Environment Canada also does “surveillance” studies on issues in specific ecosystems; these are infrequent studies of the bottom sediment and aquatic biota, but there is no comprehensive assessment of aquatic environmental quality on the Fraser River.⁶⁷⁷ Environment Canada does not do any monitoring of marine water quality except for what is done under the Canadian Shellfish Sanitation Program. It assumes that marine water quality monitoring is DFO’s responsibility.⁶⁷⁸

DFO does not conduct environmental water quality monitoring, and there are no agreements

* *Canada Water Act*, RSC 1985, c. 11; “federal waters” are, “other than in Yukon, waters under the exclusive legislative jurisdiction of Parliament and, in Yukon, waters in a federal conservation area within the meaning of section 2 of the *Yukon Act*” (s. 2(1)); “Inter-jurisdictional waters” means “any waters, whether international, boundary or otherwise, that, whether wholly situated in a province or not, significantly affect the quantity or quality of waters outside the province” (s. 2(1)).

or consultation between Environment Canada and DFO on water quality monitoring in the Fraser River system.⁶⁷⁹ A 2008 DFO Science report on the status of monitoring states: “The marine environmental quality monitoring program is very weak. Existing efforts are *ad hoc*. DFO mandate in some of this area is vague.”⁶⁸⁰ However, Canada’s Oceans Strategy states that Canada will establish and implement a marine environmental quality policy and operational framework under the *Oceans Act*.⁶⁸¹ This policy and operational framework have not been developed.⁶⁸² Dr. John Carey, former director general, Water Science and Technology, Environment Canada, stated that it would be useful for the long-term sustainability of Fraser River sockeye to have some water quality monitoring stations in the marine environment.⁶⁸³

However, until it was disbanded around 2004–5, DFO’s Pacific Region Water Quality Unit provided support and advice to Environment Canada about fish presence, fish habitat, and receiving water quality for fish.⁶⁸⁴ The Water Quality Unit worked with Environment Canada and was a window into DFO for Environment Canada’s environmental protection programs. There were annual work-planning meetings between this group and Environment Canada to share work plans, to identify priorities and issues each department was working on, and to align and coordinate activities.⁶⁸⁵ The unit provided advice on habitat impacts that supported Environment Canada’s work on controlling pollution at the source.⁶⁸⁶

Environment Canada was not consulted when DFO decided to disband its Water Quality Unit, but, when Environment Canada learned of this change, its view was that DFO had a responsibility under the 1987 Regional Working Agreement (RWA) and the 1985 “Memorandum of Understanding between the Department of Fisheries and Oceans and the Department of the Environment on the Subject of the Administration of Section 33 of the *Fisheries Act*” to continue the role that the Water Quality Unit had fulfilled.⁶⁸⁷ Environment Canada did not have the capacity in the region to take on the science advice provided formerly by DFO on water quality, and Environment Canada was not funded to do this work.⁶⁸⁸

After DFO’s Water Quality Unit was disbanded, the Environment Canada–DFO working relationship shifted from being coordinated through the unit to a program-specific context, but I was told that regulatory gaps remain, particularly

with respect to water quality advice for sectors that are not regulated under the *Fisheries Act*.⁶⁸⁹ According to Lisa Walls, former acting manager, Pollution Prevention and Assessment Section, Environmental Protection Operations, and former acting director, Environmental Protection Operations, Environment Canada, the real loss to Environment Canada was the access to DFO expertise on the effects of pollutant discharges on water quality to sustain fish.⁶⁹⁰ Dr. Ross said that, in the past, Water Quality Unit staff had key expertise in point source spills and their impacts on fish and fish habitat.⁶⁹¹

Dr. Ross testified that existing water quality guidelines are designed to either clean up a contaminated site or address a nearby contaminant source, but they are not designed to protect the environment more generally.⁶⁹² He said that water, sediment, or tissue quality guidelines developed in Canada fail to protect salmon.⁶⁹³ This failure is in part because guidelines exist for single chemicals and not complex mixtures of contaminants, although these mixtures are what fish are actually exposed to.⁶⁹⁴ The guidelines that are used by BC Ministry of Environment staff “were not designed to protect anadromous fish, were not designed to protect salmonids, and were not designed to protect the real world complexity of fish habitat.”⁶⁹⁵ His view was that Canada needs to do more research and develop supportive guidelines for the protection of anadromous fish.⁶⁹⁶

Contaminant research and monitoring

Dr. Ross testified that it is very important for Canada to decide how it will support research, monitoring, and enforcement related to environmental contaminants in the marine environment.⁶⁹⁷ He said Canada needs to better understand non-point sources as they relate to Fraser River sockeye salmon.⁶⁹⁸ Dr. Robie Macdonald, head, Marine Environmental Quality, Institute of Ocean Sciences, Science Branch, said that long-term research and monitoring of contaminants is important for understanding and tracking ecosystem health.⁶⁹⁹

Witnesses from DFO and Environment Canada testified that there are gaps between the two departments’ responsibilities and mandates concerning contaminant research and monitoring. These arise from differences in what each department thinks is

its responsibility.⁷⁰⁰ These gaps are most significant in the marine environment where neither DFO nor Environment Canada does any research or monitoring of toxic pathways and water quality.⁷⁰¹

According to Environment Canada, its mandate under section 36 of the *Fisheries Act* is to regulate pollutant discharge or prevent deposit of the pollutant at the point of discharge, and DFO's responsibility is to look at the effect of the pollutant on the fish.⁷⁰² Dr. Carey said that Environment Canada's research mandate concerning toxic chemicals is set out in a "Strategic Review of Toxic Chemicals Research in the Environmental Science Program and the Arctic Science Program, Science Sector, Fisheries and Oceans Canada":

Environment Canada conducts research to protect aquatic ecosystems from the impacts of toxic chemicals by developing knowledge and understanding of priority pollutants ... Environment Canada's projects focus on the following areas: determining the persistence, fate and exposure of toxic chemicals in aquatic environments; evaluating the effects of priority substances on aquatic organisms; developing indicators and bioassays to detect, identify and measure contaminant effects in aquatic ecosystems; and assessing the distribution and biological effects of atmospherically transported persistent organic pollutants and metals in aquatic ecosystems and food chains. The primary focus of such research is in freshwater ecosystems.⁷⁰³

Dr. André Talbot, director, Aquatic Ecosystem Protection Research Division, Water Science and Technology Branch, Environment Canada, told me that Environment Canada considers contaminant research on salmon to be a DFO issue.⁷⁰⁴

In contrast, documentary evidence and DFO witnesses told me that, based on Environment Canada's administrative responsibility for section 36 of the *Fisheries Act* and section 44 of CEPA, Environment Canada has the mandate for all point and non-point source contaminant-related monitoring, research, regulation, and enforcement; DFO is responsible for the management and protection of the fisheries resource and its habitat.⁷⁰⁵ At least in the marine environment, Dr. Sylvain Paradis, former director, Environment

and Biodiversity Science, and former director general, Ecosystem Science Directorate, DFO, testified that the department assumes that contaminant research and monitoring is Environment Canada's responsibility.⁷⁰⁶ However, Dr. Paradis said that DFO's mandate includes research into toxic chemicals to determine their effects on fish, fish habitat, aquatic ecosystems, and human use of fish and aquatic ecosystems.⁷⁰⁷

Ms. Dansereau also indicated that monitoring of contaminants is the purview of Environment Canada, but research regarding contaminant effects on anadromous fish may be DFO's responsibility.⁷⁰⁸ As well, DFO's contaminant research responsibility might be fulfilled by obtaining information from Environment Canada or another body of government.⁷⁰⁹

A 2006 report of the DFO Science Monitoring Implementation Team on aquatic monitoring in Canada says there is considerable confusion about the monitoring of contaminants: whereas Environment Canada monitors point sources in the Pacific Region, DFO monitors organisms (such as fish) for population health.⁷¹⁰ Mr. Brown, similarly said confusion exists over the mandates of Environment Canada and DFO, and that Environment Canada does not have much capacity to do monitoring work in the marine environment.⁷¹¹ He testified that funding within DFO to work on marine contaminants has been very hard to find.⁷¹² Yet, in 2006, contaminant monitoring was identified by the DFO Science Monitoring Implementation Team as a type of monitoring that would support DFO's healthy and productive aquatic ecosystem strategic outcome.⁷¹³

The 2006 DFO Science Monitoring Implementation Team report states that there is little systematic monitoring of Canada's coastal and littoral zones (the area from the high-water mark to the submerged areas) and that DFO has little ability to assess cumulative impacts.⁷¹⁴ The 2006 report identifies the need to rationalize the work done by DFO, Environment Canada, Natural Resources Canada, and Health Canada on contaminant monitoring in water, sediment, and biota.⁷¹⁵ The information in the report is only current to 2004–5, but, according to Mr. Brown, the situation had not improved by the time he testified in August 2011.⁷¹⁶

The gaps in contaminant research and monitoring between DFO and Environment Canada appear to result at least in part from major

changes DFO Science made to its Toxic Chemicals Research Program in approximately 2004–5.⁷¹⁷ As part of the 2003–4 Departmental Assessment and Alignment Project and the Treasury Board’s 2005 Expenditure Review Committee direction to cut DFO’s budget, DFO Science reduced the scope of its work on toxic chemicals nationally by the equivalent of 25 full-time staff.⁷¹⁸ This was a decision of DFO Science’s National Science Directors’ Committee, high-level DFO Science executives in Ottawa who meet to work out DFO priorities and match budgets to responsibilities.⁷¹⁹ These cuts were achieved by DFO Science refocusing its toxic chemicals research on biological impacts on fish and fish habitat and ceasing research on contaminant fate and transport pathways,* creating national Laboratories of Expertise in Aquatic Chemical Analysis, ceasing any toxic chemical environmental monitoring (but I note DFO never did toxic chemical environmental monitoring in the Pacific Region), and rolling DFO Science’s Environmental Science Strategic Research Fund (ESSRF) – which consisted of \$5 million of dedicated funding for toxic research – into a general DFO Science funding envelope.⁷²⁰ In all, \$2 million was cut from DFO Science.⁷²¹

DFO did not consult with Environment Canada on the changes the department made to its Toxic Chemicals Research Program, although there was some consultation during the initial review of the program.⁷²² Dr. Carey said that there was no coordination or communication between Environment Canada and DFO when DFO implemented these changes.⁷²³ At this time, DFO’s Water Quality Unit was disbanded, and thus coordination between DFO and Environment Canada in the Pacific Region on receiving water quality for fish like Fraser River sockeye also disappeared.

Since dissolution of the ESSRF, DFO toxic researchers have been expected to fund their work from other DFO sectors, other government departments, and non-government sources under a “client-based” funding system.⁷²⁴ The intention is that contaminant research will not be done as stand-alone research but will instead be linked to other issues in an ecosystem-based approach to science.⁷²⁵

DFO Science witnesses, both managers and scientists, described “tension” between Environment Canada and DFO with respect to contaminants’ research due to DFO largely withdrawing from the contaminants research field in 2004–5 and assuming that Environment Canada would pick up this work. However, Environment Canada was not given resources to do what was formerly done by DFO.⁷²⁶ For example, in 2004–5, Environment Canada had a very significant research program on contaminant effects on individual fish, but not on the effects on fish populations. Environment Canada told DFO that it was DFO’s job to look at the overall effect of toxic substances at the population level.⁷²⁷ When changes were made to the Toxic Chemicals Research Program, Environment Canada picked up only one of DFO’s previous programs, the Great Lakes Fish Contaminants Monitoring Program. In light of DFO’s withdrawal from contaminants research, Environment Canada examined its programs. If there were gaps, Environment Canada modified its own programs to cover off the things it thought important. No contaminants work or monitoring associated with research that was being done by DFO on Pacific salmon was incorporated into Environment Canada’s work.⁷²⁸

Dr. Ross described struggling at times to understand which department is responsible for what contaminant work and what, as a scientist, he is expected to do to support DFO’s mandate to protect fish.⁷²⁹ In Dr. Ross’s view, the ESSRF and the Toxic Chemicals Research Program allowed DFO scientists to identify problems, emerging issues, and data gaps.⁷³⁰ Dr. Macdonald testified that, since the loss of the ESSRF, there has been no coordinated approach within DFO nationally on contaminants research and that DFO’s objective of maintaining adequate in-house expertise for toxic chemicals research has not been met.⁷³¹ Dr. Macdonald also said that changes to the DFO Toxic Chemicals Research Program meant research on contaminant transport pathways has ceased, and funding of toxic research generally has been uncertain and intermittent.⁷³² As of August 2011, Dr. Ross said that DFO was doing no research on marine contaminants that could affect Fraser River sockeye salmon because there was no funding

* Chemical (or contaminant) fate and transport (pathways) is the science of understanding how and why fish have been exposed to the chemical. Toxicological or biological effects work relates to the effects on fish when they are exposed to a chemical. See Exhibit 995.

available to work on salmon and contaminants.⁷³³ Dr. Richards said that she was not aware of any specific projects that DFO toxic chemical researchers were doing on Fraser River sockeye.⁷³⁴

According to Dr. Ross, DFO Pacific Region does not have a toxicologist with expertise on fish, despite its importance to assessing population-level impacts, and little contaminants research is done on sublethal stresses on salmon.⁷³⁵ Dr. Richards said that DFO has to consider all of its many priorities and that contaminants research is only one of these. She indicated that researching the effect of contaminants on Fraser River sockeye may not be a priority for DFO.⁷³⁶

Environment Canada has the expertise to work on the fate, transport, presence, and effects of point and non-point source contaminants in the marine environment, but it is currently not doing any of this work in the Pacific Region.⁷³⁷ It does not have the expertise to do the marine side of toxic chemicals work.⁷³⁸ Both Dr. Talbot and Dr. Carey testified that there is no contaminant or ecosystem research conducted by Environment Canada on Pacific salmon or any anadromous fish.⁷³⁹ Also, Dr. Talbot said that there is no ecosystem program right now that allows Environment Canada to *prioritize* work on Pacific salmon rivers and streams.⁷⁴⁰

Dr. Ross, Dr. Paradis, Ms. Dansereau, and Graham van Aggelen, head, Environmental Toxicology Section, Pacific Environmental Science Centre, Environment Canada, said that the respective responsibilities of DFO and Environment Canada for research and monitoring of contaminants and section 36 should be clarified.⁷⁴¹ Dr. Macdonald and Dr. Paradis said that it is not clear which department should take the lead, but both agencies should probably be involved and one agency should have the lead.⁷⁴² Ms. Dansereau said that she and the deputy minister of Environment Canada are working on recommendations to resolve the confusion in mandate for their ministers.⁷⁴³

Science advice on contaminants

Both Dr. Macdonald and Dr. Ross testified about the difficulties in providing scientific advice on contaminants that could impact Fraser River sockeye. Dr. Macdonald explained that toxicology work alone is not sufficient to provide advice to regulators on contaminants.⁷⁴⁴ It is also necessary

to research contaminant fates and transport.⁷⁴⁵ Further, the limited toxicology work being done by DFO does not address effects on fish of exposure to multiple contaminants or of exposure to contaminants at various stages of the fish life cycle.⁷⁴⁶ Dr. Ross added that it is very difficult for regulators to assess complex mixtures of contaminants.⁷⁴⁷ And, as noted above, the loss of the ESSRF and reduction in the Toxic Chemicals Research Program hampers DFO scientists identifying and investigating problems, emerging issues, and data gaps.⁷⁴⁸

There is no formal mechanism through which DFO Science can provide advice to Environment Canada regulators.⁷⁴⁹ Dr. Paradis said DFO's Canadian Science Advisory Secretariat process (for a description of this process, see Chapter 4, DFO overview) is inadequate for providing timely advice to Environment Canada.⁷⁵⁰ Contaminant scientists or managers from the two departments do not sit down with their counterparts to discuss work Environment Canada and DFO should be doing on contaminants.⁷⁵¹ There is also no body in Ottawa to oversee collaborative research and monitoring on contaminants.⁷⁵²

Witnesses, both managers and scientists, agreed that it would be beneficial to have improved communication whereby DFO Science and Environment Canada could coordinate research and DFO could provide advice to Environment Canada.⁷⁵³ Dr. Carey described a national network for coordination of water-related research that was initiated by the federal government in the 1990s, in which a number of workshops were organized with representatives from the five federal natural resource departments (Health Canada, Environment Canada, DFO, Agriculture, and Natural Resources) and the National Research Council. The workshops identified four broad goals for water science along with priority areas for collaboration, one of which was producing the science and information required by the federal government to manage aquatic resources like harvested fish and shellfish; this network was about to be implemented when the government of the day fell and the initiative was abandoned.⁷⁵⁴

Several witnesses suggested that an integrated research program focused on Fraser River sockeye salmon and involving long-term research and monitoring would help ensure the long-term sustainability of the fishery. They indicated that, given the limited-term nature of federal science funding,

this kind of work is not currently possible.⁷⁵⁵ If such a program were to be implemented, it would need collaboration between Environment Canada and DFO. Although one department should have the clear lead, witnesses said funding should be shared.⁷⁵⁶

Pesticides

The broad application of pesticides to crops, lawns, and forests results in non-point source pollution in the form of runoff, which can have lethal and sub-lethal effects on Fraser River sockeye (as discussed in Volume 2). Pesticides* from spraying, erosion of contaminated soils, and contaminated groundwater can also pollute surface waters.⁷⁵⁷

Several public submissions expressed the view that pesticides have affected salmon habitat.⁷⁵⁸ Don MacDonald, lead author of Technical Report 2, Contaminants,[†] testified that the use of pesticides by the forestry sector may be one of the greatest concerns for Fraser River sockeye salmon productivity.⁷⁵⁹ Dr. Ross testified that agriculture and forestry pesticides are of concern for Fraser River sockeye health.⁷⁶⁰ Technical Report 2 describes a number of water quality concerns associated with agriculture. For example, in the Lower Fraser Valley, aquatic organisms face the potential for adverse effects due to their proximity to crops with heavy pesticide applications.⁷⁶¹ A 2003 Environment Canada study on pesticide use in Canada states that most pesticides sold and used in British Columbia were used in the forestry sector. This report also says that a number of pesticide active ingredients used exclusively in the agriculture sector accounted for 63 percent of total sales.⁷⁶²

All pesticides imported into, sold, or used in Canada are regulated federally under the *Pest Control Products Act*, SC 2002, c. 28 (PCPA) and regulations, which are administered by Health

Canada's Pest Management Regulatory Agency (PMRA). PMRA is responsible for administering the PCPA, registering pest control products, re-evaluating registered products, and setting maximum residue limits under the *Food and Drugs Act*.⁷⁶³

The province regulates the transportation, sale, use, storage, and disposal of pesticides, as well as the certification and licensing of applicators and vendors.⁷⁶⁴ British Columbia is also responsible for ensuring compliance with PMRA labelling. The provincial Ministry of Environment's Environmental Protection program implements the Integrated Pest Management program and administers the *Integrated Pest Management Act* (IPMA) and regulations. The main function of the Integrated Pest Management program is to protect the quality of British Columbia water, land, air, living and working space, and human health in a way that contributes to the sustainability of the province's resources and economy.⁷⁶⁵

Pesticide use on private property by the owner or someone who is not acting on a fee-for-service basis (for example, an employee or volunteer) does not require a licence,⁷⁶⁶ though the applicator may need a certificate if using a restricted product. The effect of the IPMA is that pesticide application to residential properties and in the agricultural sector is generally not regulated (unless the use falls into a permit- or confirmation-requiring category).

The province does not keep comprehensive information on the quantities and types of pesticides used in different areas of British Columbia.⁷⁶⁷ Information regarding pesticide application to residential properties and the agricultural sector is not collected, nor is it required to be kept by the applicator. The province collects annual summaries of the amount of pesticide used by licence, confirmation, and permit holders, but not necessarily site-specific pesticide information.⁷⁶⁸ Proponents keep more detailed records that must

* According to the *Pest Control Product Act*, SC 2002, c. 28, s. 2, a pest control product (i.e., pesticide) means:

- (a) a product, an organism or a substance, including a product, an organism or a substance derived through biotechnology, that consists of its active ingredient, formulants and contaminants, and that is manufactured, represented, distributed or used as a means for directly or indirectly controlling, destroying, attracting or repelling a pest or for mitigating or preventing its injurious, noxious or troublesome effects;
- (b) an active ingredient that is used to manufacture anything described in paragraph (a); or
- (c) any other thing that is prescribed to be a pest control product.

† Mr. MacDonald was qualified as an expert in environmental toxicology and chemistry with particular expertise in ecological risk assessment and ecosystem-based management, water quality and water use interactions, design and evaluation of contaminated sediments on ecology receptors, including fish, and the design and implementation of environmental quality monitoring programs (Transcript, May 9, 2011, pp. 9–10). His curriculum vitae is Exhibit 828.

be produced to an integrated pest management inspector upon request.⁷⁶⁹ While pesticide vendors in British Columbia have to keep a record of their sales, according to Dr. Carey sales data for pesticides are extremely unreliable as to pesticide use in a region for any given year.⁷⁷⁰ Both Dr. Carey and Mr. MacDonald agreed that better data for pesticide use are important for understanding impacts of pesticides on the Fraser River watershed.⁷⁷¹

DFO Science and Environment Canada's Aquatic Ecosystem Protection Research Division both have agreements with PMRA whereby science advice is provided to PMRA to support its regulation of pesticides.⁷⁷² There is no mechanism for DFO Science to provide advice to the province regarding pesticide use.⁷⁷³

According to Dr. Talbot, pesticide research in relation to environmental contaminants is part of Environment Canada's mandate. However, Dr. Talbot also said that, other than the agreement with PMRA, the Aquatic Ecosystem Protection Research Division only spends about 5 percent of its budget on pesticide research.⁷⁷⁴

Greywater

Greywater is wastewater originating from showers, baths, bathroom sinks, kitchen sinks, pools, spas, and laundry. It gets into the environment through municipal wastewater systems (discussed as a point source, below), septic systems, and through discharge from vessels. It can contain nutrients, bacteria, viruses, and a variety of chemicals, including endocrine disruptors associated with detergents and personal care products. According to the province, the cumulative effects of multiple vessels discharging greywater may result in the long-term disruption of nutrient levels and subsequent impacts on the ecology of a body of water, such as Shuswap Lake.⁷⁷⁵

Federally, greywater is not considered to be garbage or sewage and is not covered by the *Canada Shipping Act, 2001*, or *Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals*,* as long as it does not contain a pollutant prescribed in those regulations.⁷⁷⁶ However, in some circumstances the

general prohibition on discharges of deleterious substances set out in section 36 of the *Fisheries Act* could apply.

Provincially, the Ministry of Environment regulates greywater discharges under the authority of the *Environmental Management Act* (EMA). Section 13 prohibits a person from discharging "domestic sewage" or waste from trailers, campers, transportable housing units, boats, or houseboats onto land or into any reservoir, lake, pond, stream, or other natural water body except in compliance with a permit, approval, order, waste management plan, or EMA regulation, or if disposal facilities are provided. Domestic sewage in the EMA's *Municipal Sewage Regulation* includes greywater.⁷⁷⁷

The province is implementing compliance with the EMA, section 13, and its prohibition against greywater discharge from vessels into coastal marine waters in a phased-in approach. The province expected full compliance by spring 2010. Transport Canada has advised British Columbia that it is working on a regulatory approach for greywater discharge from small vessels that would be similar to sewage discharge. The provincial Ministry of Environment is working with Transport Canada to develop a draft greywater discharge regulation with a goal of completed draft sometime in 2011–12.⁷⁷⁸

The increase in rental boats has increased the amount of greywater entering Shuswap Lake. In 2007, the Ministry of Environment committed to a three-year compliance strategy focused on greywater discharges from boats on Shuswap Lake. As of July 28, 2010, the province had undertaken no authorization, compliance, and/or enforcement action under the EMA preventing the discharge of greywater from watercraft into Shuswap Lake.⁷⁷⁹

Point source contaminants

Three point sources of contamination for Fraser River sockeye habitat were considered in the evidentiary hearings: municipal wastewater, pulp and paper mills, and metal mining. Each is discussed below.

* After the hearings, these regulations were repealed and replaced by the *Vessel Pollution and Dangerous Chemicals Regulations*, SOR/2012-69, in force March 30, 2012. Greywater is not covered by these regulations, 2012-04-11 *Canada Gazette* Part II, vol. 146, no. 8, p. 1014.

Municipal wastewater

Municipal wastewater effluents consist of two basic types of liquid wastes: sanitary sewage and stormwater. Sanitary sewage typically contains human and other organic wastes originating from homes, industries, and businesses. Community sewer systems collect these wastes and transport them to wastewater treatment plants, where the effluents usually receive some level of treatment before being discharged into a receiving body of water. Stormwater contains many of the same compounds found in sewage, as well as surface runoff (for example, rain that drains off rooftops, lawns, roads, and other surfaces). Communities have either combined sewer systems, which combine raw sewage and stormwater, or separate sewer systems for sanitary sewage and stormwater. Stormwater carried in separate systems is discharged directly into receiving waters without treatment.⁷⁸⁰

One disadvantage with combined systems is that, during periods of heavy precipitation, they can become overloaded and wastewater is typically directed to combined sewer overflows, allowing raw sewage and untreated stormwater to overflow at many exit points upstream of the treatment facility and to enter receiving waters directly without any treatment.⁷⁸¹ Municipalities with combined sewer systems typically experience tens of overflows of such systems annually.⁷⁸² I heard from Dr. Ken Ashley, senior scientist, Northwest Hydraulic Consultants, that these discharges, depending on their magnitude and the timing, have the potential to harm Fraser River sockeye salmon. He said that there is a risk of acute toxicity and also of chronic toxicity and accumulation of persistent contaminants.⁷⁸³ Dr. Ross added that research in Puget Sound, Washington State, has shown that runoff from combined sewer overflows has created problems for salmon.⁷⁸⁴

The City of Vancouver is separating sewers at the rate of approximately 1 percent of the system per year and has a timeline to complete this work by 2050.⁷⁸⁵ Dr. Albert van Roodselaar, division manager, Utility Planning and Environmental Management,

Metro Vancouver,* said that replacing combined sewer overflows has proceeded at a regular pace.⁷⁸⁶

Also, DFO and Metro Vancouver have worked to mitigate effects on riparian areas from stormwater through the development of an Integrated Stormwater Management Plan.⁷⁸⁷ However, Mr. Salomi told me that the *Riparian Areas Regulation* (RAR) process results in smaller buffer zones along riparian areas than what is set out in this plan.⁷⁸⁸ (The RAR and its relationship to Fraser River sockeye salmon habitat protection is discussed above.)

Technical Report 2, Contaminants, reports that the highest density of wastewater treatment facilities is in the Lower Fraser River area.⁷⁸⁹ But the highest volume of municipal wastewater effluent in the province appears to be discharged into the Strait of Georgia.⁷⁹⁰ According to Environment Canada, about 90 wastewater treatment facilities currently operate in the Fraser River basin.⁷⁹¹ Technical Report 2 has a full listing and description of municipal wastewater treatment plants in the Fraser River basin.⁷⁹² The three large Lower Fraser River area wastewater treatment plants that were addressed in the hearings are Iona Island Wastewater Treatment Plant, which receives wastewater from Vancouver and parts of Burnaby and Richmond; Annacis Island Wastewater Treatment Plant, which serves a large number of Lower Mainland municipalities; and Lulu Island Wastewater Treatment Plant, which serves Richmond.⁷⁹³

According to Dr. Ross, DFO Pacific Region does not monitor or research the impacts of municipal wastewater on Fraser River sockeye salmon.⁷⁹⁴ Mr. van Aggelen testified that, in the Pacific Region, no one at Environment Canada is tasked with assessing the impact of municipal wastewater on salmon.⁷⁹⁵ Dr. Ross further said that the lack of research on the effects of chemicals in wastewater on Fraser River sockeye makes it difficult to speak with certainty about potential effects on these fish stocks.⁷⁹⁶

Regulation

Federal, provincial, and municipal levels of government share responsibility for managing the

* Metro Vancouver is the name generally given to the Greater Vancouver Regional District. It includes three entities: the Greater Vancouver Regional District with member municipalities in the Lower Mainland; the Greater Vancouver Sewerage and Drainage District, which provides wastewater treatment services to its member municipalities; and the Greater Vancouver Water District, which provides drinking water services and treatment to its member municipalities.

collection and treatment of municipal wastewater, for the administration and performance of wastewater facilities, and for controlling the environmental and health impacts of municipal effluents.⁷⁹⁷

Effluent from wastewater systems must comply with applicable federal legislation and with provincial or territorial legislation, permits, and licences.

Federally, the *Fisheries Act* and CEPA regulate the impacts of municipal wastewater. Subsection 36(3), the general pollution prevention provision of the *Fisheries Act*, applies to municipal wastewater discharges.⁷⁹⁸ There are two instruments under CEPA related to wastewater effluent: the *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents* and *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents*.⁷⁹⁹ These instruments outline performance objectives for chlorine and chlorine compounds and for ammonia in wastewater effluent.

Provincial and territorial governments are responsible for permitting municipal wastewater treatment facilities.⁸⁰⁰ Generally, under the EMA,* sewage facilities require authorization under either a permit, liquid waste management plan, or a regulation.⁸⁰¹ Section 3 of the *Waste Discharge Regulation* specifies industries, businesses, trades, operations, and activities that are exempt from the EMA and the *Waste Discharge Regulation*. British Columbia has moved to performance-based requirements for wastewater treatment facilities under the *Municipal Sewage Regulation*.⁸⁰² In some circumstances, local governments may be exempted from compliance with the *Municipal Sewage Regulation*.⁸⁰³

The province largely relies on local governments to monitor and report on their own wastewater effluent discharges, whether under the *Municipal Sewage Regulation* or under a liquid waste management plan with an operational certificate. The Ministry of Environment may conduct occasional spot checks to assess the credibility of data in municipal reports.⁸⁰⁴ The minister

may make pollution prevention orders against a municipality if satisfied that a municipal activity or operation is performed in a manner that is likely to release a substance that will cause pollution, or if the minister considers that a municipality is causing pollution, he or she may exercise pollution abatement powers.⁸⁰⁵

Municipal governments across Canada provide sewage treatment, as well as control discharges into the sewer systems.⁸⁰⁶ Each municipality is responsible for both its own sewers and the sewers from private properties that feed into municipal and Greater Vancouver Sewerage and Drainage District sewers.⁸⁰⁷ Under the EMA, regional districts, in certain circumstances, may pass bylaws regarding the direct or indirect discharge of wastes into any sewer or drain connected to the district's sewerage facilities.⁸⁰⁸ Sewer-use bylaws are the primary legal instruments used by local governments to control and limit the industrial, commercial, and institutional sources of wastes discharged to their sewer systems.⁸⁰⁹

Endocrine-disrupting chemicals like polychlorinated biphenyls (PCBs) cannot be effectively treated by wastewater treatment plants. That is why, according to Dr. van Roodseelaar, Metro Vancouver told the federal government that these compounds were best managed by prohibition (that is, by "source control") and the federal government put such a prohibition in place.⁸¹⁰ In addition, Dr. Ross testified that Metro Vancouver has very strong and important source control programs to prevent some chemicals from getting into the effluent stream.⁸¹¹ Under the EMA, industries discharging to sewers within a municipal jurisdiction are regulated by the municipality through source control programs.⁸¹²

Municipal wastewater is not currently governed by a specific regulation under section 36 of the *Fisheries Act*. However, in March 2010, Environment Canada proposed draft Wastewater Systems Effluent Regulations (WSER), which, if enacted, would apply nationwide.⁸¹³ The WSER are based, in part, on the *Canada-Wide Strategy for the*

* Under the EMA, a "sewage facility" is "works operated by a municipality to gather, treat, transport, store, utilize or discharge sewage" (s. 23). A "waste management facility" means a facility for the treatment, recycling, storage, disposal or destruction of a waste, or recovery of reusable resources, including energy potential from waste (ss. 1(1)). A "permit" is issued under section 14 or under the regulations (ss. 1(1)). A "waste management plan" means a plan that contains provisions or requirements for the management of recyclable material or other waste or a class of waste within all or a part of one or more municipalities (ss. 1(1)).

Management of Municipal Wastewater Effluents, published by the Canadian Council of Ministers of the Environment (CCME Strategy).⁸¹⁴

The WSER use the national effluent quality standards and the implementation timelines established in the CCME Strategy.⁸¹⁵ The purpose of the regulations is to provide national baseline standards for municipal wastewater treatment.⁸¹⁶ They specify conditions that must be met by any wastewater system with a capacity to deposit 10 cubic metres or more of effluent daily from its final discharge point into fish-bearing waters.⁸¹⁷ The regulations establish standards for effluent toxicity, effluent monitoring, receiving environment monitoring, record keeping, and reporting.⁸¹⁸

Under WSER transitional provisions, municipal sewage facilities will have different timelines to meet the minimum effluent standard, depending on the level of risk assessed.⁸¹⁹ In addition to monitoring to ensure effluent quality standards, some wastewater treatment facilities will also be required to undertake environmental effects monitoring (for a discussion of environmental effects monitoring, see the sections below on pulp and paper and metal mining) to evaluate the effect of the effluent quality standards in the WSER, and this monitoring will specifically address protection of fish and fish habitat.⁸²⁰

In general, the WSER do not impose limits or require testing of emerging contaminants of concern, such as pharmaceuticals, surfactants, some persistent organic pollutants, and PBDEs.⁸²¹ However, James Arnott, manager, Wastewater Section, Public and Resources Sectors Directorate, Environmental Stewardship Branch, Environment Canada, suggested that environmental effects monitoring could perhaps address some of these issues, since a municipality could include monitoring for such substances in their existing monitoring programs.⁸²²

Dr. Ross and some of his DFO toxic chemical research colleagues reviewed the WSER and provided comments to Mr. Brown.⁸²³ Dr. Ross summarized his view of the draft regulations:

I think my take-home message was, while it's important to have a clear set of terms of engagement and a national strategy[,] and national regulations would help on that front, I did express the concern that a national minimum standard does not necessarily

upgrade the performance of all wastewater treatment plants.

Certainly a minimum standard of secondary [treatment] will reduce the risk to some aspects of Fraser River sockeye habitat, because an upgrade from primary to secondary will reduce the release of a number of contaminants of concern.

Specifically, the proposed regulations cover the kinds of chemical constituents or activities thereof that we've been worried about ... But they do not, in looking at these four primary conventional pollutants, there is only fleeting mention of site-specific impacts and concerns, only fleeting mention of emerging chemicals of concerns, such as the flame retardants or the pharmaceuticals. The reporting of monitoring data appears fairly elementary, and the effects monitoring ceases to be a requirement if there are no adverse impacts observed after a certain number of years.

So I did have some concerns ... These regulations were not designed to protect salmon. They were not designed to prevent cumulative impacts associated with multiple treatment plants. And they were not really designed to deal with the concerns that I have about bioaccumulation and biomagnifications food webs.

So we did have a number of concerns about a national minimum standard ... and we did have some concerns about the fact that site-specific impacts would be subject in some form to local regulatory frameworks.⁸²⁴

Dr. Ross indicated that none of the concerns expressed by DFO contaminant scientists in their review of the WSER were incorporated into the draft regulations.⁸²⁵ Mr. Arnott was not aware of the memo by DFO toxic chemical scientists commenting on the draft regulations.⁸²⁶ He also said that there has been "ongoing communication with DFO" as Environment Canada moved from finalizing the CCME Strategy toward development of the WSER.⁸²⁷

Metro Vancouver has also expressed concern about the WSER.⁸²⁸ It passed a resolution that it "cannot commit to the Iona Wastewater Treatment Plant and the Lions Gate Wastewater Treatment Plant upgrades, as required in the CCME Strategy and the Regulations, without a

funding formula that includes the senior levels of government funding contribution.” Metro Vancouver also recommended clarification on regulation of combined sewer overflows, sanitary sewer overflows, and acute lethality test procedures; and it said that some monitoring / testing protocols under the WSER are inappropriate for marine / estuary discharges.⁸²⁹

The WSER do not address biosolids, which are not broken down by treatment and can be transferred to land and thus re-enter Fraser River sockeye salmon habitats through runoff.⁸³⁰ Mr. Arnott said that CCME is currently working on a Canada-wide approach for the management of wastewater biosolids; however, federally, there is limited authority right now to manage biosolids. He said that, although Environment Canada was – at the time of hearings – still considering input on the WSER, there were no significant changes being contemplated in terms of effluent quality standards. However, Environment Canada was contemplating a series of “fairly technical” changes.⁸³¹ Canada could prescribe higher levels of treatment requirements for particularly sensitive or important receiving environments if it saw fit to do so.⁸³²

The WSER have not yet been enacted. At the time of the hearings, Environment Canada was aiming to finalize, publish, and start implementing the regulations by the end of 2011.⁸³³

Monitoring and compliance

Metro Vancouver has an environmental monitoring program as part of its liquid waste management plan.⁸³⁴ The objective of the environmental monitoring is to collect data on parameters that might indicate a cause for concern or significant effect on the environment.⁸³⁵ Water column, benthos, sediments, and fish are surveyed.⁸³⁶ According to Dr. van Roodselaar, the environmental monitoring programs of Metro Vancouver are the most comprehensive wastewater treatment plant programs in the country, possibly the continent. These programs are reviewed on a monthly basis by Metro Vancouver’s Environmental Monitoring Committee.⁸³⁷ Representatives from the province, University of British Columbia, Simon Fraser University, the public, and Health Canada sit on this committee; neither DFO nor Environment Canada

is currently represented on the committee, though Environment Canada was present until 2009.⁸³⁸ There are no First Nations representatives.⁸³⁹ Based on his experience working with Metro Vancouver and in wastewater treatment, Dr. Ashley stated that it would be beneficial if Environment Canada and DFO participated.⁸⁴⁰

At the Iona Island Wastewater Treatment Plant (Iona), there is no environmental monitoring of migratory fish species.⁸⁴¹ Dr. Ashley said that, if one is concerned about Fraser River sockeye salmon, then environmental monitoring by wastewater plants should include the examination of pelagic species or salmon. Dr. Ross agreed.⁸⁴²

Dr. van Roodselaar testified that environmental monitoring at Iona indicates that the effects on the receiving environment from this plant are “negligible.”⁸⁴³ In response to the testimony of Dr. Ashley and Dr. Ross that there are potential negative impacts on the receiving environment at Iona, Dr. van Roodselaar said, “[T]he whole point of our monitoring program and of our Cautions, Warnings and Triggers Process, and of our review with other authorities, is to ensure to the best of our capability that that is not the case. That to the ability we can affirm it, that we are not causing a significant environmental concern.”⁸⁴⁴ Dr. Ashley recommended Metro Vancouver build upon existing studies and make monitoring of emerging contaminants a larger component of their program.⁸⁴⁵

Finally, both Dr. Ashley and Dr. Ross told me that an environmental effects monitoring program for municipal wastewater treatment plants would be useful. Dr. Ashley also said that data from environmental effects monitoring need to be shared. Dr. Ross added that the monitoring should look at sediment as well as water quality.⁸⁴⁶

Upgrades to Iona Island Wastewater Treatment Plant

DFO and Environment Canada have urged timely upgrades to Iona since 2002.⁸⁴⁷ The most recent liquid waste management plan (approved May 2011) mandates an upgrade by 2030 based on the CCME Strategy approved by Environment Canada and the province.⁸⁴⁸ Metro Vancouver has had discussions with the province and the federal government about funding for the upgrades to Iona.⁸⁴⁹

The level of upgrade being contemplated for Iona is to secondary treatment,* which is what the WSER requires. Funding is a significant issue with respect to the level of treatment that will be put in place at Iona. First Nations also need to be consulted regarding the upgrades.⁸⁵⁰

Although he acknowledged that upgrading Iona is of less immediate concern than a plant discharging directly into the Fraser River, Dr. Ashley still recommended that the plant be upgraded to the best available technology, which is “considerably beyond secondary treatment.”⁸⁵¹ In terms of priorities, Dr. Ross advocated for anything that would reduce the inputs of pesticides, persistent compounds, and pharmaceuticals. But he acknowledged that treatment, whether secondary or tertiary, does not necessarily solve the problem and that source control and preventing these chemicals from getting into the wastewater in the first place are important.⁸⁵²

Pulp and paper

As I describe in Volume 2 of this Report, pulp mills that could affect Fraser River sockeye salmon operate in the Fraser River watershed and on the shores of the Strait of Georgia and in other marine areas through which Fraser River sockeye may migrate.

Regulation

The *Pulp and Paper Effluent Regulations* (PPER) were enacted under section 36 of the *Fisheries Act*.⁸⁵³ They regulate effluent discharges from pulp and paper mills to Canadian fisheries waters. Environment Canada is responsible for administering and enforcing these Regulations. The PPER prescribe certain deleterious substances in pulp and paper mill effluent and in effluent from off-site treatment facilities.[†] Specifically, the PPER prescribe

limits to biochemical oxygen demand matter, total suspended solids, and effluent that is acutely lethal to fish.* The Regulations prohibit the discharge of acutely lethal effluent and set out discharge limits for biological oxygen demand and total suspended solids. If these regulatory conditions are not met, the discharge is unauthorized and may constitute an offence under section 36. Each mill must monitor discharges in accordance with the Regulations.⁸⁵⁴

Environmental effects monitoring seeks to verify that the load limits for the receiving environment allowed under the PPER are adequate to protect fish, fish habitat, and the fisheries resource. According to Janice Boyd, program scientist, Natural Resources Sector Unit, Environmental Protection Operations, Environment Canada, the goal is to evaluate whether regulatory changes are required. Mill owners and operators are required to conduct environmental effects monitoring to study the potential effects of effluent on the fish population, fish tissue, and benthic invertebrates. Environment Canada verifies compliance. The PPER environmental effects monitoring program requires biological monitoring studies and sublethal toxicity testing, using prescribed methods and at prescribed intervals. There are local monitoring committees for each mill with Environment Canada, the provincial Ministry of Environment, and mill representatives, and sometimes representatives from environmental organizations and First Nations.⁸⁵⁵

The *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations* (PPM Effluent Regulations) and the *Pulp and Paper Mill Defoamer and Wood Chip Regulations*, enacted under CEPA, aim to curtail the release of dioxins and furans into the receiving environment.⁸⁵⁶ Under the federal Coastal Mills Dioxin and Furan Trend Monitoring Program, mills on the BC coast must monitor dioxins and furans around their effluent outfalls.⁸⁵⁷

* Conventional wastewater treatment is categorized in three basic levels: primary, secondary, and tertiary. Each treatment level provides progressively greater removal of solids, metals, and certain contaminants. See Exhibit 1052, pp. 3–5, and Exhibit 833, p. 15.

† “Effluent” means (a) wastewater treated by an off-site treatment facility, or (b) wastewater from a mill, other than wastewater from the treatment of intake water, including process water, gas scrubbing water, boiler blow-down water, wash-down water, cooling water, leachate from any site at the mill where solid residues generated by any mill are treated or disposed of, and leachate from any site at the mill where wood chips or hog fuel are stored; “off-site treatment facility” refers to “a facility that treats effluent from a mill if the facility is neither owned nor operated by the owner of a mill” (PPER, s. 2).

‡ Biochemical oxygen demand is a measure of the oxygen demand in the receiving environment for organic matter to break down. “Acutely lethal” for effluent means that the effluent at 100 percent concentration “kills more than 50 per cent of the rainbow trout subjected to it during a 96-hour period, when tested in accordance with the acute lethality test” (PPER, s. 2).

British Columbia has a provincial regime dealing with pulp and paper mill effluent under the EMA. The *Pulp Mill and Pulp and Paper Mill Liquid Effluent Control Regulation* sets quality requirements for final effluent respecting dioxins, furans, biological oxygen demand, total suspended solids, and acute lethality. Each permittee mill is required to sample each effluent outfall at various minimum frequencies and report the data. A permittee who contravenes these provisions or intentionally submits false monitoring data commits an offence.⁸⁵⁸

Monitoring and compliance

Douglas Hill, head, Environmental Management Section, Cariboo region, Environmental Protection Division, BC Ministry of Environment, told me that provincial mine and mill permits do not consistently require immediate reports of non-compliance by the permittee; rather, non-compliance is reported in the monthly (for mills) or quarterly (for mines) reports required by the province.⁸⁵⁹ Spills or unauthorized releases exceeding certain thresholds must be reported in accordance with the *Spill Reporting Regulation* (pursuant to the EMA), and all permits require reporting of emergencies, unauthorized discharges, and equipment malfunctions.⁸⁶⁰ Mr. Hill testified that clauses requiring reporting of non-compliance have recently been incorporated into some permits. He said it would be helpful if there were a province-wide policy directing how these clauses should be developed so they are consistent.⁸⁶¹

A 2005 national assessment of pulp and paper mill environmental effects monitoring found that nutrient enrichment and metabolic disruption has been observed in fish. Some enrichment was seen in benthic invertebrate communities near BC mills, though incidents of smaller gonads were not as common in British Columbia.⁸⁶² Ms. Boyd explained that in the marine environment, Environment Canada has had difficulty in evaluating fish species effectively since the fish surveys used are designed for freshwater.⁸⁶³ In 2009, another national assessment

of the results of environmental effects monitoring found the same general trends.⁸⁶⁴

Since the PPER were enacted in the early 1990s, improvements have been made in treatment processes, and the amount of dioxins and furans, as well as biological oxygen demand and total suspended solids, released from pulp mills in the province appears to have decreased significantly.⁸⁶⁵ By 2002, six mills required annual monitoring; by 2004, only three did.⁸⁶⁶ Coastal pulp mills no longer discharge detectable levels of dioxins to marine waters.⁸⁶⁷ A 2002 paper summarizing environmental contaminants in Fraser River sockeye salmon habitat notes that research indicates a decline in the concentrations of a large number of endocrine-disrupting chemicals after secondary treatment of pulp mill effluent. All BC pulp mills have this secondary treatment in place because of the PPER.⁸⁶⁸ Also, some mills in the Fraser River watershed have had two consecutive cycles (each cycle is a three-year monitoring period) of environmental effects monitoring with no measured effects on the receiving environment.⁸⁶⁹

Despite the improvements with respect to effluent discharges from pulp and paper mills along the Fraser River sockeye salmon migratory route, Ms. Boyd testified that Environment Canada does not know if pulp and paper effluent currently has any impact on Fraser River sockeye because Environment Canada does not design its studies for this species.⁸⁷⁰ Environmental effects monitoring and effluent discharge monitoring do not evaluate health of sockeye since these programs are designed to look at resident fish species (although both she and Michael Hagen, program scientist, Natural Resources Sector Unit, Environmental Protection Operations, Environment Canada, said that sockeye are only in a discharge area for short periods of time, and thus, presumably, impacts on sockeye are less than for resident fish).⁸⁷¹ Mr. Hagen noted that, in the federal environmental assessment process for new projects,* potential impacts on migratory salmon or salmon-bearing creeks would be considered.⁸⁷²

* As discussed above, I note that Part 3, Division 1, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, enacts a new *Canadian Environmental Assessment Act, 2012* (CEAA, 2012), which repeals the *Canadian Environmental Assessment Act* (CEAA) in force at the time of the hearings. As a result, the reference to the CEAA may not reflect the current law respecting environmental assessment in Canada, nor the applicability of environmental assessments to pulp and paper mills and metal mines.

According to Robert Grace, environmental impact assessment biologist, Thompson-Nicola sub-region, Environmental Protection Division, BC Ministry of Environment, monitoring under provincial permits similarly focuses on resident fish and does not evaluate effects on migratory fish like Fraser River sockeye salmon.⁸⁷³ Also, provincial permits for pulp mills do not address endocrine-disrupting chemicals.⁸⁷⁴

Environmental effects monitoring does not address the cumulative effects of pulp and paper or mining effluent discharges into freshwater, but Ms. Boyd says that environmental effects monitoring “should go in that direction.”⁸⁷⁵ Environment Canada has not done any assessment of cumulative sublethal effects from pulp and paper or mines on migratory fish as they move through different discharges over their life cycle.⁸⁷⁶ In Ms. Boyd’s view, cumulative effects could be better assessed to understand impacts on Fraser River sockeye salmon, starting with bringing the different groups and scientists working in this area together to develop an assessment strategy.⁸⁷⁷ In contrast, Mr. Hagen stated that it would be a “real challenge” to assess cumulative effects.⁸⁷⁸ The province does not appear to assess cumulative effects, but Mr. Hill thought that cumulative effects may be something considered in an environmental assessment rather than the individual permitting process.⁸⁷⁹

I invited all witnesses who testified on pulp and paper and metal mining to comment on the recommendations regarding monitoring set out in Technical Report 2, Contaminants.⁸⁸⁰ These recommendations relate to contaminants generally and not specifically to those in pulp and paper or mining effluents. All the witnesses agreed with Recommendation 5 that coordination among government agencies and regulated interests should be improved to ensure requisite data are collected and compiled into a single database or multiple compatible databases.⁸⁸¹ However, Mr. Hill noted that it would be useful to focus efforts on the types of discharges that might pose a risk to salmon.⁸⁸² Ms. Boyd suggested using existing databases where possible and noted that it would require resources to maintain the database as well as to develop it.⁸⁸³ Finally, Mr. Hagen noted that to develop and maintain such a system would be difficult given scarce resources.⁸⁸⁴

Both Mr. Hill and Mr. Grace agreed that ambient monitoring should include direct measures of effects on sockeye (such as morphology, physiology, en route mortality, pre-spawn mortality, and egg viability), although Mr. Hill said that this work was fish health monitoring and not ambient environmental quality monitoring that might be part of routine or permit monitoring by the province.⁸⁸⁵ Mr. Hagen pointed out that, because sockeye are migratory and are exposed to a variety of different environments, determining which exposure causes what effects is difficult.⁸⁸⁶

Ms. Boyd said the suggestion in Technical Report 2, Contaminants, that routine monitoring programs should be developed and implemented to provide the data needed to characterize exposure of sockeye to aquatic contaminants throughout their life cycle, would be appropriate as part of a monitoring program. Mr. Hill said such monitoring may not be part of routine water quality monitoring, but would rather be a special project. In Mr. Grace’s view, an initial monitoring program should be developed to look at a wide range of contaminants and habitats to identify which contaminants and habitats may be problematic or at least detectable. Subsequent monitoring should focus on problematic contaminants and habitats. Ms. Boyd, Mr. Hill, and Mr. Grace generally agreed that monitoring programs should address several environmental quality variables on different temporal and spatial scales.⁸⁸⁷

Technical Report 2, Contaminants, recommends that monitoring programs address contaminants of concern set out in Table 8.1 of that report.⁸⁸⁸ Witnesses said the table identifies every potential contaminant and thus was unrealistic; they thought only relevant parameters or near-term priorities should be addressed. Each made specific suggestions as to what they thought would be the most relevant parameters for setting near-term priorities (as does Technical Report 2).⁸⁸⁹

Finally, with respect to recommendations regarding monitoring generally, Mr. Hagen said:

It is easy to agree that more monitoring studies should be done or that more data should be collected. The challenge is deciding how much of our scarce funding and manpower resources should be devoted to which studies collecting what data. It is often the case that new issues

will arise and there is no data to assess the issue because the issue could not be anticipated. Data gaps are easy to recognize in hindsight. Existing programs collect data on a generic set of indicator parameters at what is seen to be an appropriate temporal and spatial distribution. Yes, we should periodically review and evaluate these programs to check if they provide necessary and sufficient data – there is no point in monitoring for the sake of monitoring. If it is determined that there are unacceptable gaps that need to be filled, then programs can be developed and implemented to fill the gaps. It's complicated because decision makers also consider whether resources should instead be expended on programs addressing impacts which are even more unacceptable. And the judgment about what is “unacceptable” also needs to be made!⁸⁹⁰

Metal mining

Mines, and metal mines in particular, have the potential to adversely affect water quality.⁸⁹¹ Several public submissions raised concerns about metal mining in the Fraser River watershed.⁸⁹² At the time of the hearings there were seven active metal mines in the Fraser River watershed: Endako (Prince George area), Huckleberry (Houston area), Gibraltar (between Williams Lake and Quesnel), Mount Polley (near Williams Lake), Quesnel River (near Quesnel), Highland Valley (near Kamloops), and Bralorne (Bridge River area).⁸⁹³ The first six of these are open-pit mines, and Bralorne is an underground gold mine. The Endako mine discharges into a creek that drains into François Lake (a sockeye-rearing lake) and into the Endako River that drains into Fraser Lake.⁸⁹⁴ Huckleberry discharges into the Tahtsa Reach on the Nechako Reservoir, so some of the discharge may ultimately enter the Fraser River.⁸⁹⁵ There are also a number of closed or abandoned mines in the Fraser River watershed, not all of which are known to Environment Canada or the province.⁸⁹⁶ However, Mr. Hagen said that a fair bit is known about most of the closed mines, and although some of these mines could be discharging to the Fraser River system, where problems have been identified they have been addressed.⁸⁹⁷

Regulation

Federally, the *Metal Mining Effluent Regulations* (MMER) are enacted under subsection 36(5) and other provisions of the *Fisheries Act*.⁸⁹⁸ The MMER authorize metal mines to deposit deleterious substances into fish-bearing waters under certain conditions (these deposits would otherwise be prohibited by subsection 36(3) of the *Fisheries Act*). They apply to metal mines with an effluent flow rate exceeding 50 cubic metres per day into water frequented by fish.⁸⁹⁹ Mines to which the MMER do not apply, including closed mines, remain subject to the general prohibition against depositing deleterious substances in subsection 36(3) of the *Fisheries Act*.⁹⁰⁰ Of the seven active metal mines in the Fraser River watershed, four are subject to the MMER: Endako, Huckleberry, Gibraltar, and Bralorne.⁹⁰¹ Mines subject to the MMER must conduct monthly testing in accordance with specific procedures.⁹⁰² Frequency of testing can be reduced or increased depending on test results.⁹⁰³ Mines submit annual reports summarizing effluent monitoring results.

Under the MMER, mines must conduct environmental effects monitoring, which is described above in relation to municipal wastewater and pulp and paper mills. Two types of environmental effects monitoring studies are required: (1) effluent and water quality monitoring; and (2) biological monitoring.⁹⁰⁴ Results of effluent and water quality monitoring are reported annually.⁹⁰⁵

The parameters monitored are set nationally and do not necessarily reflect particular contaminants expected to be discharged from an individual mine. As described for pulp and paper mills (see above), there are local monitoring committees for each mine. Through these committees, Environment Canada may recommend that a mine monitor and report on additional parameters.⁹⁰⁶ In contrast, the provincial permit-based monitoring parameters are determined on a site-specific basis (and this system is the same for permits for pulp and paper mills). The province usually includes within the permit parameters suggested by Environment Canada.⁹⁰⁷

In 2009, Environment Canada produced an *Environmental Code of Practice for Metal Mines*. Designed to support the MMER, these guidelines recommend various practices to mitigate identified environmental concerns. Mines are advised, but not required, to comply with the Code.⁹⁰⁸

A proposed mine may also trigger an environmental assessment under the CEAA. For example, if a proposed mine would harm fish habitat and thus require an authorization under subsection 35(2) of the *Fisheries Act*, or if it would involve a tailings impoundment area under Schedule II of the MMER, then an environmental assessment under the CEAA must be conducted.*

The provincial *Mines Act* is the primary statute governing mining in British Columbia. A permit under section 10 of the *Mines Act* is generally required before starting any work at a mine. Pursuant to the *Mines Act*, the *Health, Safety and Reclamation Code for Mines in British Columbia* applies to all mines.⁹⁰⁹ Part 9 of the Code addresses mining exploration in riparian areas. It establishes riparian setbacks on streams, wetlands, and lakes.⁹¹⁰ Part 9 of the Code also addresses protection of community watersheds, soil conservation to support vegetation regrowth, minimizing risks of erosion-related events, remediation for erosion-related events that harm fish habitat, road construction, stream crossings, water management, storage and use of fuel and lubricants, and reclamation.⁹¹¹

Subsection 120(3) of the EMA makes it an offence to discharge waste from a prescribed industry or activity without authorization. Mining is a prescribed industry, and therefore most mines require a waste discharge permit. Waste discharge permits may be subject to requirements for the protection of the environment.⁹¹² For mines, the permits typically include requirements related to surface runoff, mine drainage, and monitoring and reporting. As discussed above, provincial mine permits do not consistently require immediate reports of non-compliance by the permittee; rather, non-compliance would be reported in quarterly reports required by the province.⁹¹³

The BC Ministry of Energy and Mines (or predecessor ministries) and Ministry of Environment have jointly developed policies and guidelines on the management of mine effluent.⁹¹⁴ In 2009, the two ministries developed a Memorandum of Understanding on the Regulation of Impoundments

and Diversions on a Mine Site. Under this agreement, the Ministry of Environment's Environmental Protection Division is responsible for the protection of human health and the environment from any adverse effects of mine wastes or impoundments, the use of hazardous materials, and the management of contaminated sites. The Ministry of Environment is also responsible for regulating the quantity and quality of discharges to the environment from mining activities, and it will refer all applications for waste management permits and amendments dealing with mine tailings discharges to the Ministry of Energy and Mines for advice.⁹¹⁵

Monitoring and compliance

Environment Canada enforces the MMER in accordance with the Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* (for a description of this policy, see Chapter 7, Enforcement).⁹¹⁶ Mr. Hagen's impression is that BC mines are generally in compliance with most MMER parameters, or if not, the non-compliance is usually a relatively minor issue.⁹¹⁷

The three MMER mines in the Fraser River watershed that have submitted environmental effects monitoring reports (Endako, Huckleberry, and Gibraltar) have all exceeded limits for effluents and/or failed biological monitoring tests in the period 2006–9.⁹¹⁸ Mr. Hagen described the results from interpretative reports of environmental effects monitoring for Endako, Huckleberry, and Gibraltar mines (these reports are done on a three-year cycle as per environmental effects monitoring reports for pulp and paper mills as discussed above). Endako found enrichment effects on benthos and an “inhibitory” effect on young-of-the-year fish; Huckleberry did not find any effects on fish or benthos; and Gibraltar has not yet issued its first cycle report.⁹¹⁹ Mr. Hagen explained that an “inhibitory” effect in terms of fish means slower growth, poorer condition, lower abundance, and smaller size at age. Bralorne has not yet submitted an interpretative report.⁹²⁰

* As discussed above, I note that Part 3, Division 1, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, enacts a new *Canadian Environmental Assessment Act, 2012* (CEAA, 2012) and repeals the *Canadian Environmental Assessment Act* (CEAA) in force at the time of the hearings. Under the CEAA, 2012, these circumstances may no longer require an environmental assessment as they did under CEAA, para. 5(1)(d).

In December 2005, Environment Canada initiated a national review of the environmental effects monitoring program, and published the results in the *Metal Mining Environmental Effects Monitoring Review Team Report*, 2007.⁹²¹ Another report produced in 2007 presents a national assessment of environmental effects monitoring data collected in 2004 and 2005.⁹²² Mr. Hagen spoke about a recommendation from the Monitoring Review Team to continue communications among all stakeholders involved in environmental effects monitoring on an annual basis to discuss new science and other issues as they arise.⁹²³ He said that Environment Canada is implementing this process, and he provided some examples where stakeholders, including First Nations, were invited to provide feedback on aspects of the environmental effects monitoring program or were part of local monitoring committees.⁹²⁴

As noted above for pulp and paper mills, environmental effects monitoring and the provincial process do not address cumulative effects of mining effluents, nor does Environment Canada assess cumulative sublethal effects on migratory fish as they move through different discharge areas over their life cycle.⁹²⁵

Findings

Non-point source contaminants

Environment Canada's water quality monitoring in the Fraser River system does not provide information about most contaminants of concern to Fraser River sockeye, likely because providing this information is not the purpose of Environment Canada's monitoring program. Furthermore, Environment Canada does not conduct any marine water quality monitoring that is relevant to the health of Fraser River sockeye. The Department of Fisheries and Oceans (DFO) does not take responsibility for water quality monitoring as it relates to sockeye in either the freshwater or the marine environment.

I accept the evidence of Environment Canada and DFO witnesses who testified that there were gaps in non-point source contaminant research and monitoring with respect to Fraser River sockeye salmon because of differences between what each department views as its responsibility. All witnesses

agreed that it would be beneficial to Fraser River sockeye to have improved communication, coordination of research, and a mechanism for DFO to advise Environment Canada about contaminants. I find that DFO and Environment Canada should clarify their respective responsibilities for research and monitoring of contaminants (other than contaminants covered by *Fisheries Act* regulations) that could affect Fraser River sockeye salmon and anadromous fish.

I also find that, as a result of the loss of the Pacific Region Water Quality Unit, Environment Canada no longer has access to DFO expertise on the effects of pollutant discharges (including discharges from marine spills) on water quality necessary to sustain fish.

Contaminant monitoring as it relates to the health of Fraser River sockeye salmon has been neglected by DFO and Environment Canada for jurisdictional reasons. It matters little whether Environment Canada considers its jurisdiction to cease at the end of an outfall pipe, or that DFO's decision to cut its Toxic Chemicals Research Program nearly a decade ago and to disband its Pacific Region Water Quality Unit was done without consultation. The effect is that neither department is currently monitoring contaminants in freshwater or marine habitat that may negatively affect Fraser River sockeye productivity.

Finally, I note that the province does not keep comprehensive information on the quantities and types of pesticides used in different areas of the province. Information regarding pesticide application to residential properties and the agricultural sector is not collected, nor is the applicator required to keep that information. Although pesticide vendors must keep a record of their sales, I was told that sales data for pesticides are extremely unreliable as to pesticide use in a region for any given year. I am satisfied that better data on the use of pesticides are important in order to understand their impacts on the Fraser River watershed.

Municipal wastewater

In the Pacific Region, DFO is not involved in monitoring or researching the impacts of municipal wastewater on Fraser River sockeye or other salmon, nor is anyone from Environment Canada tasked with assessing the impacts of municipal

wastewater on salmon. Municipal wastewater is not currently governed by a specific regulation under section 36 of the *Fisheries Act*. However, in March 2010, Environment Canada proposed draft Wastewater Systems Effluent Regulations (WSER) which, if enacted, would apply nationwide. From the evidence I heard, the WSER would provide a useful regulatory tool, and I encourage Canada to finalize these regulations.

I also agree with Dr. Ken Ashley, senior scientist, Northwest Hydraulic Consultants, and Dr. Peter Ross, research scientist, Marine Environmental Quality Section, Institute of Ocean Sciences, Science Branch, who said that an environmental effects monitoring program for municipal wastewater plants would be useful to protect Fraser River sockeye salmon. This program should impose limits or require testing of emerging contaminants of concern such as pharmaceuticals, surfactants, and some persistent organic pollutants and polybrominated diphenyl ethers (PBDEs). Also, Canada should have a regulatory strategy to limit impacts of wastewater biosolids on fisheries resources.

With respect to monitoring of wastewater effluent in the Fraser River watershed, I heard that the Iona Island Wastewater Treatment Plant (Iona) does not monitor effluent effects on migratory fish species, but Dr. Ross and Dr. Ashley said that environmental monitoring of wastewater plants should include the examination of pelagic species or salmon. I accept this evidence. I also accept the evidence of Graham van Aggelen, head, Environmental Toxicology Section, Pacific Environmental Science Centre, Environment Canada, and Dr. Ross that it is important to change current toxicological methods to gauge effluent quality of point source discharges.

Based on the testimony of Dr. Albert van Roodselaar, division manager, Utility Planning and Environmental Management, Metro Vancouver, and Dr. Ross, I find that treatment of wastewater cannot effectively reduce some contaminants of concern such as PBDEs, and thus source control programs are important.

Finally, although based on the limited evidence before me I do not make any recommendations regarding upgrades to Iona, I encourage Metro Vancouver to upgrade this facility to the best available technology by 2030 or before if possible.

Pulp and paper mills and metal mines

I accept the evidence of Janice Boyd, program scientist, Natural Resources Sector Unit, Environmental Protection Operations, Environment Canada, that there have been improvements with respect to effluent discharges from pulp and paper mills along the Fraser River sockeye salmon migratory route. However, I also accept her evidence and that of Robert Grace, environmental impact assessment biologist, Thompson-Nicola sub-region, Environmental Protection Division, BC Ministry of Environment, that current monitoring of pulp and paper and metal mining effluents does not evaluate the health of Fraser River sockeye, nor does Environment Canada assess the cumulative sublethal effects of pulp and paper and metal mining effluent on migratory fish. DFO and Environment Canada should co-operatively work to ensure the consideration of Fraser River sockeye in environmental effects monitoring of pulp and paper mills and metal mines.

I discuss these findings and any related recommendations in Volume 3 of this Report.

■ Habitat enhancement and restoration

In Volume 2 of this Report, I summarize the expert evidence relating to salmon enhancement activities and the decline in productivity of Fraser River sockeye. I summarize the evidence on fish health management in relation to enhancement facilities in Chapter 9, Fish health management. In the section that follows, I describe the evidence regarding salmon habitat enhancement and restoration activities relevant to the management of Fraser River sockeye salmon.

Enhancement and restoration policies

As described previously in this chapter, one goal of the 1986 Habitat Policy for the Management of Fish Habitat (1986 Habitat Policy) is fish habitat restoration, which involves rehabilitating “the productive capacity of fish habitats in selected areas where economic or social benefits can be achieved

through the fisheries resource.” Another stated goal is fish habitat development, which involves improving and creating “fish habitats in selected areas where the production of fisheries resources can be increased for the social or economic benefit of Canadians.”⁹²⁶

One of the implementation strategies in the 1986 Habitat Policy is “habitat improvement.” It is the means by which DFO says it will support projects and provide advice to community and conservation groups to restore and develop fish habitats. Under this strategy,

habitats may be restored by rehabilitating streams; eliminating or controlling exotic species, predators, parasites, and competitors; removing man-made and storm-related physical barriers; and, in co-operation with Environment Canada, requiring the installation and operation of suitable waste treatment technology.⁹²⁷

Co-operative action is another implementation strategy of the 1986 Habitat Policy. This strategy involves DFO supporting involvement by government agencies, public interest groups, and the private sector to conserve, restore, and develop fish habitats. Implementation is to be assisted by co-operative arrangements, such as national or regional committees and foundations, or boards with industry, non-government groups, other government agencies, and DFO representatives.⁹²⁸

The Wild Salmon Policy (WSP) states that enhancement-based production of salmon will continue to address social and biological objectives by rebuilding populations with an unacceptable chance of extirpation, and by providing harvest opportunities and fishery benefits.⁹²⁹ It also states:

- The enhancement program will continue to evolve towards greater emphasis on community stewardship, habitat restoration and rebuilding of priority CUs [Conservation Units].
- Enhancement may be used to provide harvest opportunities and fishery benefits as part of an integrated strategic plan.
- The risks of hatchery production to wild salmon will be assessed through

the development of a biological risk assessment framework.⁹³⁰

Strategy 5 of the WSP deals with annual program delivery. Action steps 5.3 and 5.4 relate to habitat enhancement and restoration. Action Step 5.3 states that annual work plans will specify priorities for habitat rehabilitation or restoration work to be done by DFO alone or in partnership with others and will specify investigative work needed to fill knowledge gaps. Planning for restoration and habitat improvements will incorporate projects conducted by First Nations, volunteers, and stakeholders and make use of more accessible data from a number of sources. Annual reports on regulatory functions related to key habitats and restoration and rehabilitation works are supposed to be prepared. Action Step 5.4 stipulates that long-term objectives for enhancement projects will be set as part of a planning or recovery process for a Conservation Unit. Enhancement programs will last more than a year, but annual production targets and strategies will be documented in yearly Integrated Fisheries Management Plans (described in Chapter 5, Sockeye fishery management) and will be consistent with objectives for CUs. Also under Action Step 5.4, adult salmon production is to be assessed for adherence to the rebuilding schedule and enhancement guidelines and practices.⁹³¹

The draft 2008 Enhancement Guidelines for Salmon Enhancement Programs (Enhancement Guidelines) describe the Salmonid Enhancement Program (SEP) and its objectives, identify risks of enhancement, outline considerations in planning enhancement programs, and identify policies that govern these programs. The Enhancement Guidelines state that “populations targeted for enhancement should be those stocks believed likely to become extinct in a few generations without intervention,” or populations currently at a level substantially below the carrying capacity of a given system. The Enhancement Guidelines also say that enhancement for sustaining fisheries aims “to increase a population above a natural productivity level (or return it to a former productivity level), and may be used to establish, stabilize, or maintain harvest opportunities for First Nations [and other sectors].”⁹³²

The Enhancement Guidelines contain specific directions about what managers should consider

when assessing management strategies and weighing associated risks, benefits, and costs of enhancement.⁹³³

Initiatives and programs

Salmonid Enhancement Program

The Salmonid Enhancement Program (SEP) is unique to the Pacific Region and includes hatcheries, community stewardship, and resource restoration activities.⁹³⁴ SEP applies to all salmonids: sockeye, chum, coho, pink, and chinook salmon, as well as cutthroat and steelhead trout (although the latter two species are managed by the province).⁹³⁵ The program was established in 1977 primarily to increase harvest,⁹³⁶ but it now has three major functions:

- a. Fish production: To conserve and preserve vulnerable salmon stocks and to sustain fisheries;
- b. Community involvement: To increase public awareness and build community stewardship; and
- c. Resource restoration: restoring, developing and improving fish habitat.⁹³⁷



Inch Creek Hatchery, BC, 2010

Until 2007, SEP unit managers at regional headquarters all reported directly to the regional director of OHEB. Since approximately 2008, these managers have reported to a director of SEP who reports functionally to the regional director of OHEB and directly to the regional director general.⁹³⁸ Although the program is part of OHEB

in the Pacific Region, it reports functionally to, and is funded through, the Ecosystems and Fisheries Management sector nationally.⁹³⁹

An executive-level SEP Leadership Team provides direction. Its members include: regional director, OHEB (team lead); regional director, Fisheries and Aquaculture Management; Fisheries Management staff at national headquarters; regional director, Science; director, SEP; area directors; and SEP managers / OHEB area managers as required. The Regional Management Committee makes key decisions about the program.⁹⁴⁰

Although SEP was launched with the goal of doubling the catch of salmon within 30 years, many salmon stocks, despite enhancement efforts, have declined, including Fraser River sockeye and South Coast chinook and coho. Total catch of Pacific salmon by Canada has declined dramatically since the mid-1990s as well. SEP's original goal of doubling the commercial catch has failed, although Upper Adams sockeye are cited as an example of an enhancement success, and enhancement may play a role in keeping the Cultus Lake stock from extinction.⁹⁴¹

SEP has a multi-pronged approach to enhancing wild salmon stocks that includes:

- *hatcheries* – provision of controlled spawning, protected incubation, and, usually, rearing of salmon to fry or smolt size;
- *spawning channels* – groundwater or river-fed man-made structures that increase the available spawning and incubation area and improve conditions for spawning and in-gravel incubation;
- *semi-natural fish culture structures* – incubation boxes, side-channel spawning / rearing, etc. to increase freshwater survival with low-tech / low-cost intervention;
- *fishways* – placement of structures or removal of obstructions to improve fish passage;
- *habitat improvements* – placement or removal of structures to increase spawning and rearing productivity;
- *lake and stream enrichment* – addition of nutrients / carcasses to lakes and streams to increase primary productivity and hence food availability for juvenile salmon; and
- *public education* – classroom and educational activities; outdoors club; and other community-

based activities to increase awareness and stewardship of fish stocks and habitat and to provide economic opportunities in remote communities.⁹⁴²

As of the hearings in May 2011, there were 23 major enhancement facilities and spawning channels managed by government employees, 21 community hatcheries operated as part of the Community Economic Development Program, and about 350 public involvement projects supported by 18 DFO community advisors in the area offices.⁹⁴³

DFO's major facilities have been licensed under the *Pacific Aquaculture Regulations* since December 2010 (for more information on these regulations, see chapters 8, Salmon farm management, and 9, Fish health management).⁹⁴⁴ According to Dr. Christine MacWilliams, fish health veterinarian, SEP, the licence conditions and protocols for hatcheries are not as detailed as the ones under which salmon farms operate. She said the different licences are

constructed to demonstrate the differences between those practices and how they operate and what their goals are. So the licences for the enhancement programs are not as detailed as the aquaculture industry licence but it's a reflection of what we do and that we are releasing fish as juveniles. We're not holding them throughout their entire lives.⁹⁴⁵

She also added that hatcheries use native stocks in native watersheds.⁹⁴⁶

In the Fraser River watershed, there are four spawning channels (Weaver, Gates, Horsefly, and Nadina) and two hatcheries that produce sockeye (Upper Pitt River and Cultus Lake).⁹⁴⁷ There was also hatchery production in the Upper Adams area in 1988, 1992, 1996, 2000, and 2001.⁹⁴⁸ The average annual Fraser River hatchery sockeye releases for 2006–9 were 2.7 million, and average annual Fraser River total enhanced sockeye (hatchery and spawning channel) releases for 2006–9 were 40 million with about 90 percent from spawning channels.⁹⁴⁹ For comparison, the average annual BC enhanced sockeye releases for 2006–9 were 170 million with about 97 percent from spawning channels, and the average annual BC enhanced salmon releases for 2006–9 were 348 million, which contributed about

6 percent of the total releases of all salmon species into the North Pacific.⁹⁵⁰ Although most DFO major facilities are not producing Fraser River sockeye salmon, 13 of these facilities are located within the Fraser River watershed and Strait of Georgia.⁹⁵¹



Weaver Creek Spawning Channel, BC, 2010

DFO's Community Involvement Program aims to bring people from communities throughout the province together to participate in locally based enhancement efforts. This program includes the following:

- Community Economic Development Program;
- Public Involvement Program, which helps to secure donated labour, expertise, and other resources to re-establish salmonid populations in rivers and streams and includes:
 - Streamkeepers Program, which trains and supports citizens in the monitoring, protection, and improvement of aquatic habitat;
 - Community Advisors who provide technical advice and financial support to volunteer salmon enhancement and watershed stewardship projects;
 - A range of educational material to teach school children about the value of the salmon resource (e.g. "Salmonids in the Classroom");
 - StreamTalk stewardship newsletter; and
 - Storm Drain Marking Program; and
- Salmon Enhancement and Habitat Advisory Board, which is a public consultation group intended to assist DFO in developing policy.⁹⁵²

Through SEP's Community Economic Development Program, DFO contracts with community-based groups to operate local enhancement projects, such as hatcheries, raceways, spawning channels, or aeration towers. DFO intends the program to help restore depleted salmonid stocks in British Columbia and to improve the self-reliance, independence, and social and economic stability of Aboriginal people. More than half of the 21 Community Economic Development Program projects are operated by First Nations and the rest by community organizations. Most projects are located in remote or rural communities.⁹⁵³ Nine of the projects are located within the Fraser River watershed and Strait of Georgia.⁹⁵⁴

The Public Involvement Program provides seed funding (usually less than \$10,000) and in-kind contributions of technical support by a DFO community advisor to volunteer-based projects operated by individuals and community organizations at arm's length from DFO. This program includes projects focused on habitat conservation and restoration, stewardship, public education and outreach, and small volunteer-run hatcheries. Projects also include stream monitoring, assessment, watershed planning, advisory services, and streamkeepers. Across the province, DFO community advisors have an annual operating budget of approximately \$1.35 million.⁹⁵⁵

SEP also undertakes significant or major habitat rehabilitation projects beyond the skills, ability, duration, and budget of volunteers. These efforts fall under the Resource Restoration Program and include building side channels, improving water flows and stabilizing stream banks, rebuilding estuaries, removing barriers to fish migration, and planting streamside vegetation. SEP works on these projects* with a wide variety of partners, including First Nations, industry, community and conservation groups, private landowners, and other government agencies.⁹⁵⁶

The annual portion of the SEP budget allocated to the Resource Restoration Program is about \$3 million,[†] and from this money about \$25 million more is contributed by non-government participants.⁹⁵⁷

SEP funding is approximately \$26 million annually and has been stabilized at this level since 2004.⁹⁵⁸ Consistent with testimony I heard regarding other DFO program budgets, there is no annual adjustment for inflation.⁹⁵⁹

According to Greg Savard, former director, SEP, and Carol Cross, former manager, SEP Strategic Initiatives, approximately 75 percent of SEP's budget supports DFO's major fish production operations and facilities (major enhancement facilities) and the remainder goes to the Resource Restoration Program (approximately \$3 million) and the Community Involvement Program (which includes the Community Economic Development Program, about \$3 million).⁹⁶⁰ Mr. Savard also explained that, in addition to its \$26 million annual budget, SEP also gets between \$2 million and \$5 million annually from a national infrastructure fund to support its major enhancement facilities.⁹⁶¹ Further, for 2009–11, SEP also received \$8 million from Canada's Economic Action Plan for infrastructure upgrades.⁹⁶²

Because of inflation and increasing and competing demands for SEP resources, there is no flexibility in the program to address new priorities or even to maintain existing facilities. Closure of major enhancement facilities could provide funding flexibility, but senior managers told me that ministerial approval is required to close down hatchery facilities and that previous public resistance to hatchery closures makes this option unattractive to the department.⁹⁶³ When significant changes to fish production plans are proposed, a comprehensive briefing process is undertaken that includes regional senior officials and national sector staff including the sector assistant deputy minister in Ottawa. In the past, it appears that decisions to close and divest DFO fish production facilities were ministerial decisions.⁹⁶⁴

When asked about whether she had any concerns with the level of SEP funding, Ms. Cross indicated that she was generally content with the budget as it currently is (amount and allocation). She testified that the current level of funding is adequate to substantially address the programs that SEP needs to carry out. She also said she thought that \$3 million

* A list of Lower Fraser area habitat restoration projects carried out by SEP's Resource Restoration Program that may provide benefits to Fraser River sockeye is set out in Table 3 of Exhibit 735 (TR 12, Lower Fraser Habitat), p. 57.

† I note that Ms. Reid testified that the funding for the Resource Restoration Program is approximately \$5 million, but on this detail I prefer the evidence of Mr. Savard and Ms. Cross that the amount is around \$3 million.

in funding for all the resource restoration work in the province is enough, since DFO is able to raise a lot of private funds for this work.⁹⁶⁵ However, Mr. Savard said that some resource restoration projects are not done because they have no funding.⁹⁶⁶

The Pacific Fisheries Resource Conservation Council's 2001 report, *The Role of Public Groups in Protecting and Restoring Habitats in British Columbia, with a Special Emphasis on Urban Streams*, states that SEP's focus on artificial restoration methodologies rather than restoration or protection of habitat may have done more damage than good over the years because it gave the public the perception that unnatural human intervention is sufficient to maintain fish stocks in the face of increasing watershed degradation.⁹⁶⁷ Several of the public submissions to the Commission recommended restoration, community stewardship, and education as priorities for DFO.⁹⁶⁸ Some members of the public thought that the role of fish production in fisheries management and hatchery programs should be reviewed and reconsidered.⁹⁶⁹ In contrast, I also heard from some people who stressed the importance of hatcheries and thought that DFO should increase hatchery production and/or funding.⁹⁷⁰

Freshwater Fisheries Society of BC

In addition to the salmon production managed by DFO (discussed above), the Freshwater Fisheries Society of BC also operates hatcheries. The Freshwater Fisheries Society of BC is a non-profit organization that works in conjunction with the province to support the British Columbia fish-stocking program and conservation fish culture activities. Several hatcheries are located in areas through which Fraser River sockeye salmon migrate.⁹⁷¹

Lake Enrichment Program

Lake enrichment (or fertilization) is a salmon enhancement technique that attempts to improve the freshwater rearing conditions of wild sockeye salmon. It involves adding nutrients to surface waters of selected lakes during the sockeye growing season to increase the amount of plankton (food) for juvenile salmon. Nutrient addition does not increase sockeye salmon abundance in every

lake, perhaps because the size of some sockeye populations is not dependent on food availability in their freshwater growth phase. According to DFO, nutrient addition cannot solve all the problems with sockeye stocks in the province.⁹⁷²

In 1977, under the direction of DFO Science, a Lake Enrichment Program was initiated. From its inception, the program was considered primarily a research program to investigate the ecology of BC coastal lakes. This research-focused approach continued until 1997, when the SEP Enhancement Operations Division took over administration of the program from Science Branch. With respect to Fraser River sockeye, Chilko Lake was fertilized in 1988 and in 1990–93 and Adams Lake was fertilized in 1997 and 2001.⁹⁷³ Great Central Lake on Vancouver Island is the only lake still being enriched.⁹⁷⁴

Sunsetted habitat enhancement and restoration programs

I heard evidence that DFO used to invest more funds and resources on habitat enhancement and restoration, as opposed to fish production, than it did at the time of the Commission's hearings.

In the 1990 federal budget, the Fraser River watershed was singled out as requiring priority action because of its high fisheries, ecosystem, and environmental values. In 1991, as part of its Green Plan, the government established the Fraser River Action Plan, sponsored by DFO and Environment Canada. The plan was to last six years and came with \$100 million in funding. It ended on March 30, 1997. Fraser River Action Plan goals were to build partnerships, reverse environmental degradation in the Fraser River basin, rehabilitate degraded areas, and develop a management program to achieve sustainable development. Specific objectives included a 30 percent reduction in the discharge of harmful industrial effluents by 1996, and the virtual elimination of releases of persistent toxic substances by the year 2000. Another objective was to double sockeye salmon stocks within 20 years from an average of 8 million fish in the 1975–86 period to 16 million. The first objective, building partnerships, involved the creation of the Fraser River Estuary Management Program, the Burrard Inlet Environmental Action Plan, and the precursor to the Fraser Basin Council.⁹⁷⁵

In 1998, the minister of fisheries and oceans announced a five-year, \$100 million Resource Rebuilding Strategy aimed at conserving and protecting Pacific salmon and their habitat.⁹⁷⁶ This strategy was part of the Pacific Fisheries Adjustment and Restructuring Program. Key components included the Habitat Conservation and Stewardship Program; the Habitat Restoration and Salmon Enhancement Program; the Strategic Stock Enhancement Program; and the Pacific Salmon Endowment Fund.

The Habitat Conservation and Stewardship Program was in place from 1998 to March 31, 2003.⁹⁷⁷ In British Columbia, the program was managed primarily through a program manager in OHEB, the five area chiefs, and five area coordinators, as well as a steering committee, an operations committee, and DFO regional headquarters' support staff.⁹⁷⁸ Under the program, new staff were hired and positions created to liaise with potential stewardship partners and community organizations and to help provide funding and support for projects, programs, and activities to benefit fish and fish habitat.⁹⁷⁹ Four types of positions were developed and funded: stewardship coordinator, habitat steward, habitat auxiliary, and habitat fishery officer.⁹⁸⁰ The role of habitat fishery officers in enforcement is discussed in Chapter 7, Enforcement.

The Habitat Restoration and Salmon Enhancement Program provided funding for habitat restoration projects from fiscal year 1997/98 to 2001/02. The focus was habitat restoration, stock rebuilding, and resource and watershed stewardship.⁹⁸¹ Some parts of the Strategic Stock Enhancement Program – for example, certain hatchery operations – are still operational.

The Pacific Salmon Endowment Fund Society is a non-profit society established by DFO to be the custodian of the Pacific Salmon Endowment Fund. The society is responsible for setting program priorities for funding. Since 2001, the Pacific Salmon Foundation has had an agreement with the society to be the program manager for the annual funds and to participate in the growth of the fund. The monies are to be used to develop recovery plans for specific watersheds and coordinate actions aimed at rebuilding Pacific salmon stocks. These recovery plans are supposed to include an understanding of the current state of salmon and their habitat, biological limits to recovery, local and

regional fisheries, and the potential and requirements for recovery.⁹⁸²

Interactions between wild and enhanced salmon

Expert evidence about potential interactions between wild and enhanced fish is summarized in Volume 2 of this Report.⁹⁸³ In short, I heard that increasing fish densities in the North Pacific may have negative impacts on wild stocks, including Fraser River sockeye salmon.

DFO witnesses told me there are no studies by SEP or DFO Science to try to quantify the risk of over-exploitation of wild Fraser River sockeye salmon in mixed-stock fisheries with co-migrating enhanced populations.⁹⁸⁴ Ms. Cross stated that this issue is not one that SEP would research.⁹⁸⁵ There are also no studies by SEP or DFO looking at the effects of competition between wild and hatchery salmon in the marine environment.⁹⁸⁶ In Ms. Cross's view, such studies are "complex and large and require significant resources to undertake," and there is limited capacity to undertake such large studies.⁹⁸⁷ SEP has, however, recently asked DFO Science to develop a study to determine the carrying capacity for salmonids in the Strait of Georgia to aid production planning decisions at Strait of Georgia hatchery facilities. At the time of the hearings in May 2011, this study had not yet been designed.⁹⁸⁸

There is also no biological risk assessment framework within which to evaluate the risks of hatchery production to wild salmon as envisioned by the Wild Salmon Policy.⁹⁸⁹ Ms. Cross said SEP is working on a biological assessment framework to assess hatchery impacts on wild salmon. Under this framework, SEP has produced a Hatchery Risk Analysis Tool, which is intended to enable identification and description of localized risks to wild salmon stocks in freshwater associated with hatchery production. The current draft framework does not identify or consider risks relating to competition among juveniles. For freshwater adult interactions, it includes a risk assessment of competition for spawning area and interbreeding owing to enhanced populations straying from their hatchery of origin during spawning. The framework also does not identify any risks associated with

hatchery production in the marine environment except for an evaluation of the effect of enhancement on harvest rates of a wild stock.⁹⁹⁰ The framework is intended to be completed in another year and will be updated on an ongoing basis.⁹⁹¹ Ms. Cross testified that this biological assessment framework is different from the biological *risk* assessment framework referred to in the WSP.⁹⁹²

Both Mr. Savard and Ms. Cross said that, if the department better understood interactions between wild and enhanced salmon in the marine environment, it could better manage enhancement.⁹⁹³

Dr. Randall Peterman, professor and Canada Research Chair in Fisheries Risk Assessment and Management, School of Resource and Environmental Management, SFU, testified about the pressing need for research into the early marine survival of Pacific salmonids and the role of hatchery production.⁹⁹⁴ In his view, potential interactions between enhanced and wild fish are known and should be investigated further.⁹⁹⁵ He also said that, as part of the management regime, the enhancement of salmon of any species should be planned as large-scale experiments, and evaluations of such plans should take into account density-dependent processes in the benefit / cost analyses (see discussion of density-dependent processes in Volume 2 of this Report).⁹⁹⁶ On an international scale, he advocated for coordinated programs organized by the North Pacific Anadromous Fish Commission or an analogous international treaty organization to address potential interactions on the high seas among salmon from different countries.⁹⁹⁷

Findings

Interactions between enhanced and wild salmon in the marine environment have not yet been researched and taken into account in the management of the fishery by the Department of Fisheries and Oceans (DFO). This situation should be remedied immediately by research aimed at understanding the interactions between enhanced and wild salmon in the marine environment. In order to meet DFO's

obligation to ensure the health of wild stocks, management steps such as those described in the Wild Salmon Policy (WSP) should be taken to manage the risk of harm to the wild stocks in a manner consistent with the precautionary approach.

The WSP provides that Salmonid Enhancement Program (SEP) will "continue to evolve towards greater emphasis on community stewardship, habitat restoration, and rebuilding of priority conservation units (CUs)." The policy states that risks to wild salmon because of hatchery production will be assessed through the development of a biological risk assessment framework. SEP has not yet incorporated the required elements of the WSP. The policy also contemplates that annual SEP production targets and strategies will be consistent with objectives for CUs. Annual enhancement targets and strategies are currently set out in Integrated Fisheries Management Plans. Because the enhancement targets and strategies are not provided at the CU level, there is no indication of whether these targets are consistent with Wild Salmon Policy CU objectives.⁹⁹⁸ As well, Action Step 5.4 of the WSP stipulates that long-term objectives for enhancement projects will be set as part of a planning or recovery process for a CU.⁹⁹⁹ I note, however, that no recovery plans are yet developed under Strategy 4 of the WSP.

Based on the evidence before me, DFO does not appear to have considered closing hatcheries or changing SEP funding allocations to increase funding to the Resource Restoration Program and Community Involvement Program. It is important to note that habitat restoration and stewardship education do not create the risk to wild populations that the large production of hatchery fish may pose (see the discussion in Volume 2). A shift in funding priorities from hatchery infrastructure to habitat restoration programs would appear to be consistent with the precautionary principle, with the acknowledged shift from SEP's historical focus on providing harvest opportunities to supporting fish conservation, and with implementation of the WSP.¹⁰⁰⁰

I discuss these findings and any related recommendations in Volume 3 of this Report.

Notes

- 1 Presentation by Rob Dainow (New Westminster Public Forum, September 20, 2010), summary available at www.cohencommission.ca.
- 2 Public submission 0256-BRAUER, available at www.cohencommission.ca.
- 3 Presentation by Terry Slack (New Westminster Public Forum, September 20, 2010), summary available at www.cohencommission.ca.
- 4 Public submission 0268-GUERIN, available at www.cohencommission.ca.
- 5 Public submission 0271-REZANSOFF, available at www.cohencommission.ca.
- 6 Presentation by Laura Dupont (New Westminster Public Forum, September 20, 2010), summary available at www.cohencommission.ca.
- 7 Public submission 0682-SWANSTON, available at www.cohencommission.ca.
- 8 Public submission 0268-GUERIN, available at www.cohencommission.ca.
- 9 Public submission 0328-NICKERSON, available at www.cohencommission.ca.
- 10 Public submission 0327-WATER_588416, available at www.cohencommission.ca.
- 11 SC 1992, c. 37.
- 12 Public submission 0824-SWANSTON, available at www.cohencommission.ca.
- 13 Public submission 0608-TRAYNOR, available at www.cohencommission.ca.
- 14 Presentation by Elena Edwards (Chilliwack Public Forum, September 29, 2010), summary available at www.cohencommission.ca.
- 15 Public submission 0328-NICKERSON, available at www.cohencommission.ca.
- 16 RSC 1985, c. F-14.
- 17 Public submission 0216-HENSELWOOD, available at www.cohencommission.ca.
- 18 Public submission 0216-HENSELWOOD, available at www.cohencommission.ca.
- 19 Public submission 0245-HUSBAND, available at www.cohencommission.ca.
- 20 Public submission 0274-LOEWEN, available at www.cohencommission.ca.
- 21 Public submission 0329-WILSON, available at www.cohencommission.ca.
- 22 Jason Hwang, Transcript, April 5, 2011, p. 1; Rebecca Reid, Transcript, April 5, 2011, pp. 1–2; Patrice LeBlanc, Transcript, April 5, 2011, p. 2.
- 23 Randy Nelson, Transcript, April 8, 2011, p. 75.
- 24 Exhibit 8, pp. 12–13.
- 25 Exhibit 260.
- 26 Exhibit 33-27, p. 6; Exhibit 33-28, p. 6; Exhibit 654, p. 11.
- 27 Rebecca Reid, Transcript, April 4, 2011, p. 56; Exhibit 33-30, p. 2; Exhibit 654, p. 2.
- 28 Rebecca Reid, Transcript, April 4, 2011, p. 55; Exhibit 654, p. 2.
- 29 Exhibit 33-27, pp. 6–7; Exhibit 33-28, pp. 6–7. See also PPR 8, pp. 7–11, and PPR 14, pp. 14–15.
- 30 Exhibit 654, p. 5.
- 31 Exhibit 671, p. 1.
- 32 Patrice LeBlanc, Transcript, April 4, 2011, pp. 56–57.
- 33 Transcript, April 4, 2011, p. 57.
- 34 Rebecca Reid, Transcript, April 4, 2011, pp. 55–56; see also PPR 8, p. 9.
- 35 Rebecca Reid, Transcript, April 5, 2011, pp. 53, 55.
- 36 Exhibit 654, p. 10.
- 37 Exhibit 654, p. 5.
- 38 Canada's written submissions, pp. 74, 204, available at www.cohencommission.ca.
- 39 Transcript, April 4, 2011, p. 30.
- 40 Transcript, April 4, 2011, pp. 30–31; Rebecca Reid, Transcript, April 4, 2011, p. 46.
- 41 Transcript, April 4, 2011, p. 59.
- 42 PPR 8, p. 90.
- 43 Exhibit 35, p. 29.
- 44 Exhibit 653, pp. 2–4.
- 45 Rebecca Reid, Transcript, April 4, 2011, pp. 48–49; Exhibit 653, p. 2.
- 46 See Exhibit 1923.
- 47 PPR 8, p. 93.
- 48 Exhibit 88, pp. 12–13.
- 49 Exhibit 35, pp. 29–30.
- 50 Exhibit 653; Jason Hwang, Transcript, April 4, 2011, pp. 45–46; see also Michael Crowe, Transcript, June 8, 2011, p. 23.
- 51 Jason Hwang, Transcript, April 4, 2011, pp. 47.
- 52 Transcript, April 6, 2011, p. 31.
- 53 *Fish Protection Act*, SBC 1997, c. 21, s. 6(2).
- 54 *Sensitive Streams Designation and Licensing Regulation*, BC Reg 89/2000, Schedule of Designated Streams.
- 55 *Fish Protection Act*, SBC 1997, c. 21, ss. 4(1)(g) and 4(3).
- 56 *Riparian Areas Regulation*, BC Reg 376/2004.
- 57 *Water Act*, RSBC 1996, c. 483, s. 2.
- 58 *Water Regulation*, BC Reg 204/88, s. 44.
- 59 *Forest and Range Practices Act*, SBC 2002, c. 69 [FRPA].
- 60 *Forest Planning and Practices Regulation*, BC Reg 14/2004 [FPPR].
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- 70 Transcript, April 4, 2011, pp. 59–60.
- 71 Exhibit 737, pp. 345–49; Jason Hwang, Transcript, April 4, 2011, p. 31.
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- 73 Exhibit 260, p. 11.
- 74 Exhibit 260, pp. 11–12; Figure 1.
- 75 Exhibit 260, pp. 15–21.
- 76 Exhibit 260 p. 22.
- 77 Exhibit 260, pp. 22–23.
- 78 Exhibit 260, p. 23.
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- 80 Exhibit 260, p. 26.
- 81 PPR 8, p. 19.
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- 88 Exhibit 35, p. 33; Exhibit 650, p. 2; Patrice LeBlanc, Transcript, April 4, 2011, p. 23.
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- 98 Transcript, April 4, 2011, p. 19.
- 99 Patrice LeBlanc, Transcript, April 4, 2011, p. 19; Transcript, April 5, 2011, p. 79.
- 100 Transcript, April 4, 2011, pp. 13–14; Transcript, April 5, 2011, p. 4.
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- 105 Transcript, April 8, 2011, p. 33.
- 106 Transcript, November 2, 2010, p. 32.
- 107 Transcript, September 22, 2011, pp. 26–27.
- 108 Transcript, September 22, 2011, p. 26.
- 109 Transcript, September 22, 2011, p. 28.
- 110 Transcript, September 22, 2011, p. 27.
- 111 Transcript, April 5, 2011, p. 93.
- 112 Transcript, April 6, 2011, p. 32.
- 113 Exhibit 260, p. 6.
- 114 PPR 8, p. 20.
- 115 Exhibit 35, pp. 12, 31.
- 116 Transcript, April 4, 2011, p. 30; Transcript, April 5, 2011, p. 4.
- 117 Transcript, April 4, 2011, p. 14.
- 118 Transcript, April 4, 2011, pp. 16–17.
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- 120 Patrice LeBlanc, Transcript, April 4, 2011, pp. 14, 30; Claire Dansereau, Transcript, November 2, 2010, p. 33.
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- 123 Rebecca Reid, Transcript, April 4, 2011, p. 16.
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- 126 Transcript, April 4, 2011, pp. 28, 61, 89–90.
- 127 Transcript, April 4, 2011, p. 29.
- 128 Transcript, April 4, 2011, p. 61.
- 129 Transcript, June 8, 2011, p. 73.
- 130 Transcript, September 22, 2011, p. 34.
- 131 Patrice LeBlanc, Transcript, April 4, 2011, pp. 8–10.
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- 136 Transcript, September 22, 2011, p. 28.
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- 138 Transcript, September 22, 2011, pp. 29–30.
- 139 Exhibit 260, p. 23. See also PPR 8, pp. 31–47.
- 140 Exhibit 260, p. 25.
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- 142 Patrice LeBlanc, Transcript, April 4, 2011, pp. 69–70.
- 143 PPR 8, p. 18.
- 144 PPR 8, p. 32.
- 145 Michael Crowe, Transcript, June 8, 2011, pp. 12, 18.
- 146 PPR 8, p. 32.
- 147 Exhibit 1624, pp. 6–7.
- 148 Exhibit 1624, pp. 9, 14–15.
- 149 Exhibit 1624, p. 18.
- 150 Exhibit 1624, p. 19.
- 151 PPR 8, p. 40.
- 152 Exhibit 1624, pp. 19–21.
- 153 PPR 8, p. 40.
- 154 Exhibit 1624, p. 22.
- 155 Exhibit 671, p. 3. Note, during the hearings Canada entered into evidence an earlier (July 2009) version of this document as Exhibit 658.
- 156 Rebecca Reid, Transcript, April 4, 2011, p. 64.
- 157 PPR 8, pp. 42–43.
- 158 Exhibit 671, pp. 17–20.
- 159 Exhibit 671, pp. 12–14.
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- 161 Exhibit 671.
- 162 Corino Salomi, Transcript, June 8, 2011, pp. 12–20; Patrice LeBlanc, Transcript, April 4, 2011, p. 90; Michael Crowe, Transcript, June 8, 2011, p. 12; PPR 8, p. 37; PPR 8, Appendix 5 and Appendix 6; Dave Carter, Transcript, April 6, 2011, p. 66; Exhibit 671, p. 2.
- 163 Michael Crowe, Transcript, June 8, 2011, pp. 12, 18.
- 164 Michael Crowe, Transcript, June 8, 2011, pp. 4–5.
- 165 Exhibit 671, p. 13.
- 166 Exhibit 35, p. 27; Patrice LeBlanc, Transcript, April 4, 2011, p. 35. See also PPR 8, pp. 23–28.
- 167 PPR 8, pp. 24–25.
- 168 Transcript, April 4, 2011, p. 34.
- 169 PPR 8, p. 25; Exhibit 1624, p. 5.
- 170 Exhibit 680, p. 1; Dave Carter, Transcript, April 6, 2011, p. 5; Patrice LeBlanc, Transcript, April 4, 2011, p. 35.
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- 179 Jason Hwang, Transcript, April 4, 2011, p. 87; Exhibit 647.
- 180 Corino Salomi, Transcript, June 7, 2011, pp. 20–21, 99; Michael Crowe, Transcript, June 7, 2011, pp. 98, 100.
- 181 PPR 8, p. 28.
- 182 Exhibit 651, p. 6.
- 183 Exhibit 651, p. 10; Rebecca Reid, Transcript, April 5, 2011, p. 11.
- 184 Transcript, April 4, 2011, p. 37; Transcript, April 5, 2011, p. 93.
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- 186 Transcript, April 5, 2011, p. 20.
- 187 Michael Crowe and Corino Salomi, Transcript, June 8, 2011, pp. 21–22.
- 188 Transcript, June 8, 2011, pp. 25–27; Exhibit 1003.
- 189 Corino Salomi, Transcript, June 8, 2011, pp. 10–12; Michael Crowe, Transcript, June 8, 2011, pp. 3–4.
- 190 Patrice LeBlanc, Transcript, April 4, 2011, p. 91.
- 191 Jason Hwang, Transcript, April 4, 2011, p. 32; Patrice LeBlanc, April 4, 2011, pp. 90–91; Claire Dansereau, Transcript, September 22, 2011, p. 31.
- 192 Transcript, April 4, 2011, p. 91.
- 193 Transcript, April 4, 2011, pp. 32–33.
- 194 Jason Hwang, Transcript, April 5, 2011, pp. 12–13.
- 195 Transcript, April 4, 2011, pp. 31–32.
- 196 Rebecca Reid, Transcript, April 4, 2011, pp. 33–34.
- 197 Transcript, September 22, 2011, p. 32.
- 198 Transcript, September 22, 2011, p. 33.
- 199 Jason Hwang, Transcript, April 5, 2011, p. 78; Dave Carter, Transcript, April 6, 2011, pp. 66–67.
- 200 Michael Crowe, Transcript, June 8, 2011, p. 14.

- 201 Transcript, April 8, 2011, pp. 34–35.
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- 205 Transcript, June 8, 2011, pp. 5–7.
- 206 *Canadian Environmental Assessment Act*, SC 1992, c. 37 [CEAA], s. 4(1)(a). See also PPR 8, pp. 49–73.
- 207 *Environmental Assessment Act*, SBC 2002, c 43 [BC EAA].
- 208 BC EAA, ss. 5(1), 6(1).
- 209 *Reviewable Projects Regulation*, BC Reg 370/2002.
- 210 *Law List Regulations*, SOR/94–636.
- 211 CEAA, ss. 11(1), 2 (definition of “responsible authority”).
- 212 CEAA, ss. 5(1)(a), (b), and (c).
- 213 CEAA, ss. 12(1) and (2).
- 214 CEAA, ss. 7(1)(a), (b) and (c), 7.1, and Schedule; the *Exclusion List Regulations*, 2007, SOR/2007–108.
- 215 CEAA, ss. 14–45; Patrice LeBlanc, Transcript, April 4, 2011, p. 81.
- 216 CEAA, s. 20.
- 217 CEAA, ss. 37(2), (2.1), and (2.2).
- 218 CEAA, ss. 5(1)(d), 11(2), and 13.
- 219 CEAA, s. 38 and s. 2 (definition of “follow up program”).
- 220 PPR 8, pp. 56, 60; Exhibit 654, p. 11.
- 221 CEAA, s. 18(3).
- 222 PPR 8, pp. 69–70.
- 223 Dave Carter, Transcript, April 6, 2011, p. 9; Exhibit 260, p. 21.
- 224 Exhibit 678, p. 4; Dave Carter, Transcript, April 6, 2011, pp. 3, 7.
- 225 Transcript, April 6, 2011, pp. 8, 38.
- 226 See, e.g., Exhibit 673, p. 7; Exhibit 678, pp. 4–5.
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- 228 Exhibit 678, p. 5.
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- 245 Transcript, April 8, 2011, p. 12.
- 246 Transcript, April 6, 2011, pp. 3, 5–6, 37.
- 247 Dave Carter, Transcript, April 6, 2011, pp. 20–22.
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- 251 Exhibit 678, p. 5; Dave Carter, Transcript, April 6, 2011, pp. 15, 17.
- 252 Transcript, April 6, 2011, pp. 15–16.
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- 258 Transcript, April 6, 2011, pp. 24, 26–27; Exhibit 679, p. 6.
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- 270 PPR 8, p. 85; Dave Carter, Transcript, April 6, 2011, p. 30; Exhibit 678, p. 9.
- 271 SOR/92–269; SOR/2002–222; Janice Boyd, Transcript, June 13, 2011, p. 12; Exhibit 1025.
- 272 Janice Boyd, Transcript, June 13, 2011, p. 18; *Metal Mining Effluent Regulations*, s. 23.
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- 274 PPR 19, pp. 27–28.
- 275 Exhibit 8, pp. 20, 22, 25.
- 276 Transcript, September 22, 2011, p. 30.
- 277 Michael Crowe, Transcript, June 7, 2011, p. 89.
- 278 Transcript, June 8, 2011, p. 70.
- 279 *Fish Protection Act*, s. 12(1).
- 280 Stacey Wilkerson, Transcript, June 8, 2011, p. 29.
- 281 Exhibit 1007, p. iii; Stacey Wilkerson, Transcript, June 8, 2011, p. 30.
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- 283 PPR 14, p. 21.
- 284 Exhibit 1007, pp. 4–8; Stacey Wilkerson, Transcript, June 8, 2011, p. 30.
- 285 *Riparian Areas Regulation*, BC Reg 376/2004, s. 1(1).
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- 287 Exhibit 1007, pp. 9–11; see also Stacey Wilkerson, Transcript, June 8, 2011, pp. 55–56.
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- 289 Corino Salomi, Transcript, June 8, 2011, p. 52.
- 290 Stacey Wilkerson, Transcript, June 8, 2011, p. 33.
- 291 Exhibit 1007, p. iii.
- 292 *Riparian Areas Regulation*, BC Reg 376/2004, s. 4(2).
- 293 Michael Crowe, Transcript, June 8, 2011, p. 35; Jason Hwang, Transcript, September 16, 2011, p. 95.
- 294 *Riparian Areas Regulation*, BC Reg 376/2004, s. 4(3); Exhibit 1007, p. 36.
- 295 Stacey Wilkerson, Transcript, June 8, 2011, p. 34.
- 296 Michael Crowe, Transcript, June 8, 2011, p. 35; Exhibit 1007, p. 37; see also Exhibit 1008; Michael Crowe, Transcript, June 8, 2011, p. 38.
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- 298 *Yanke v. Salmon Arm (City)*, 2010 BCSC 814.
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- 301 Jason Hwang, Transcript, September 16, 2011, p. 95.
- 302 Stacey Wilkerson, Transcript, June 8, 2011, pp. 41, 49.
- 303 Exhibit 1009, p. 2.
- 304 Exhibit 1009, p. 4.
- 305 Stacey Wilkerson, Transcript, June 8, 2011, p. 43; see also Exhibit 1009.
- 306 Transcript, June 8, 2011, pp. 44–45, 48–49; see also Exhibit 1009, pp. 6–9; Exhibit 1010, pp. 13–15.
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- 308 Stacey Wilkerson, Transcript, June 8, 2011, p. 44; Exhibit 1010, p. 15.
- 309 Exhibit 1010, p. 15.
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- 311 Transcript, June 8, 2011, p. 43.
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- 313 Transcript, June 8, 2011, p. 57.

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- 315 Michael Crowe, Transcript, June 8, 2011, p. 9; Stacey Wilkerson, Transcript, June 8, 2011, p. 33.
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- 320 Stacey Wilkerson, Transcript, June 8, 2011, p. 75; see also Michael Crowe, Transcript, June 8, 2011, p. 75.
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- 325 Transcript, June 8, 2011, pp. 8–9; see also Exhibit 1018.
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- 335 Randy Nelson, Transcript, April 8, 2011, p. 76.
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- 338 Stacey Wilkerson, Transcript, June 8, 2011, pp. 65–66; Exhibit 1015, pp. 4, 11.
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- 368 Transcript, September 16, 2011, p. 13.
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- 370 Exhibit 1856, p. 3.
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- 375 Transcript, September 15, 2011, p. 61.
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 434 *Mines Act*, RSBC 1996, c. 293.
 435 Laura Rempel, Transcript, June 16, 2011, pp. 8–9; Julia Berardinucci, Transcript, June 16, 2011, p. 74; Jason Hwang, Transcript, July 7, 2011, p. 2.
 436 Jason Hwang, Transcript, June 16, 2011, pp. 76–77.
 437 Exhibit 1076.
 438 Exhibit 1077.
 439 Jason Hwang, Transcript, June 16, 2011, pp. 75–76, 80–81; Exhibits 1093; Exhibit 1094, p. 2.
 440 Exhibit 1076, p. 2.
 441 PPR 16, pp. 17–18.
 442 Laura Rempel, Transcript, June 16, 2011, p. 7; Exhibit 1078.
 443 Exhibit 1078.
 444 PPR 16, p. 19.
 445 Jason Hwang, Transcript, June 16, 2011, p. 75.
 446 Laura Rempel, Transcript, June 16, 2011, pp. 8–9.
 447 PPR 16, pp. 19–20.
 448 Exhibit 1078; Exhibit 1094, p. 2.
 449 Exhibit 1076, pp. 6–7; PPR 16, pp. 26–27; Exhibit 1080, pp. 5–6; Exhibit 1082.
 450 Exhibit 1094, p. 3.
 451 PPR 16, p. 28.
 452 Laura Rempel, Transcript, June 16, 2011, pp. 18–19; Exhibit 1085; Exhibit 1086, p. 2.
 453 Exhibit 1086, p. 3; see also Exhibit 1085, pp. 2–3.
 454 Exhibit 1085, p. 3.
 455 Transcript, June 16, 2011, pp. 21–22, 36–37.
 456 Exhibit 1087; Laura Rempel, Transcript, June 16, 2011, p. 16.
 457 Laura Rempel, Transcript, June 16, 2011, p. 16; Exhibit 1087.
 458 Jason Hwang, Transcript, June 16, 2011, pp. 82–83.
 459 Transcript, June 16, 2011, p. 34.
 460 Laura Rempel, Transcript, June 16, 2011, pp. 17, 59.
 461 Transcript, June 16, 2011, pp. 83–84.
 462 Transcript, June 16, 2011, pp. 55–56.
 463 Transcript, June 16, 2011, p. 56.
 464 *Constitution Act*, 1867, 30 & 31 Vict, c. 3, s. 92A(1)(b).
 465 *Forest and Range Practices Act*, SBC 2002, c. 69.
 466 Exhibit 1108, p. 1.
 467 PPR 17, p. 29.
 468 *Forest Range and Practices Act*, SBC 2002, c. 69, s. 21.
 469 *Forest Planning and Practices Regulation*, BC Reg 14/2004, ss. 8–8.1.
 470 *Forest Planning and Practices Regulation*, BC Reg 14/2004, ss. 47–52.
 471 *Forest Planning and Practices Regulation*, BC Reg 14/2004, ss. 47–49, 53, 55–57.
 472 Exhibit 1109, p. 24.
 473 Ian Miller, Transcript, June 17, 2011, p. 26.
 474 Ian Miller, Transcript, June 17, 2011, p. 22.
 475 Exhibit 1112.
 476 Exhibit 1110.
 477 Exhibit 1115.
 478 Exhibit 1111.
 479 Exhibit 1116; PPR 17, p. 47.
 480 PPR 8, Appendix 6, p. 115.
 481 Peter Delaney, Transcript, June 17, 2011, pp. 29–30, 55; Exhibit 1117; Exhibit 1127.
 482 Exhibit 1117, p. 1.
 483 Exhibit 1116, p. 4.
 484 PPR 17, pp. 59–60.
 485 Peter Tschaplinski, Transcript, June 17, 2011, p. 14; Exhibit 1108, pp. 6–7.
 486 PPR 17, p. 60.
 487 PPR 17, p. 61.
 488 PPR 17, pp. 63–64.
 489 Transcript, June 17, 2011, p. 37.
 490 Exhibit 1130, pp. 1, 19, 20.
 491 Transcript, June 17, 2011, p. 69.
 492 Exhibit 1130, pp. 3, 19.
 493 PPR 17, pp. 66–67.
 494 Exhibit 1109, pp. 5, 10.
 495 Transcript, June 17, 2011, p. 9.
 496 Transcript, June 17, 2011, p. 51.
 497 Transcript, June 17, 2011, pp. 56, 69.
 498 Ian Miller, Transcript, June 17, 2011, p. 70.
 499 Transcript, June 17, 2011, p. 56.
 500 Exhibit 1107; Peter Tschaplinski, Transcript, June 17, 2011, p. 11.
 501 Transcript, June 17, 2011, p. 31.
 502 PPR 17, pp. 53–54; Peter Delaney, Transcript, June 17, 2011, pp. 34–35.
 503 Peter Delaney, Transcript, June 17, 2011, pp. 19, 81–82.
 504 Exhibit 1003, pp. 9–10.
 505 Transcript, June 17, 2011, p. 20.
 506 Peter Delaney, Transcript, June 17, 2011, pp. 52–53.
 507 Exhibit 662; PPR 17, p. 55.
 508 Transcript, June 17, 2011, pp. 20, 72.
 509 Transcript, June 17, 2011, p. 82.
 510 Peter Delaney, Transcript, June 17, 2011, pp. 19, 53–54; Peter Tschaplinski, Transcript, June 17, 2011, pp. 57, 59.
 511 Peter Delaney, Transcript, June 17, 2011, p. 59.
 512 Peter Delaney, Transcript, June 17, 2011, p. 77.
 513 Peter Delaney, Transcript, June 17, 2011, pp. 62–63.
 514 Transcript, June 17, 2011, pp. 19, 52.
 515 PPR 17, pp. 69–74; Exhibit 1109, p. 55.
 516 PPR 17, p. 70.
 517 PPR 17, p. 73.
 518 PPR 17, pp. 73–74.
 519 PPR 17, p. 74.
 520 Peter Tschaplinski, Transcript, June 17, 2011, p. 45; Exhibit 1124, p. 5.
 521 Ian Miller, Transcript, June 17, 2011, pp. 80–81.
 522 Peter Tschaplinski, Transcript, June 17, 2011, pp. 75–76.
 523 PPR 19, p. 42.
 524 PPR 19, pp. 43–44.
 525 PPR 19, p. 44.
 526 Exhibit 562, pp. 27–29; Public submission 0100–WL–SASC_971766, available at www.cohencommission.ca.
 527 Canada's written submissions, p. 205, available at www.cohencommission.ca.
 528 See PPR 19, pp. 14–18, 25–31.
 529 *Canadian Environmental Protection Act*, 1999, SC 1999, c. 33.
 530 CEPA, s. 120. An overview of CEPA instruments addressing municipal wastewater is provided in PPR 15, Municipal Wastewater, and the section of this chapter addressing municipal wastewater effluents.
 531 *Environmental Management Act*, SBC 2003, c. 53.
 532 *Waste Discharge Regulation*, BC Reg 320/2004.
 533 *Canada Shipping Act*, SC 2001, c. 26.
 534 See also PPR 19, pp. 30–31.

- 535 Sergio Di Franco, Transcript, August 17, 2011, p. 56. See also PPR 19, p. 27.
- 536 Sergio Di Franco, Transcript, August 17, 2011, pp. 55, 82; *Oceans Act*, SC 1996, c. 31.
- 537 See Exhibit 1380, called the “National Contingency Plan” in the hearings.
- 538 *The Marine Liability Act*, SC 2001, c. 6, makes shipowners and operators liable in relation to pollution, passengers, cargo, and property damage. It sets limits of liability and establishes uniformity by balancing the interests of ship owners and other parties.
- 539 Sergio Di Franco, Transcript, August 17, 2011, p. 55.
- 540 PPR 19, pp. 28–29.
- 541 PPR 19, p. 29.
- 542 Sergio Di Franco, Transcript, August 17, 2011, pp. 98–99.
- 543 Sergio Di Franco, Transcript, August 17, 2011, pp. 56–59.
- 544 Transcript, August 18, 2011, pp. 32–33, 58–58; Exhibit 1380.
- 545 Sergio Di Franco, Transcript, August 17, 2011, pp. 61, 68–69.
- 546 Transcript, August 17, 2011, p. 61.
- 547 Peter Ross, Transcript, August 17, 2011, p. 61; Bruce Reid, Transcript, August 17, 2011, p. 62; Sergio Di Franco, Transcript, August 17, 2011, p. 63.
- 548 Transcript, August 17, 2011, pp. 63–64, 72.
- 549 Transcript, August 17, 2011, p. 61.
- 550 Sergio Di Franco, Transcript, August 17, 2011, pp. 64, 67–68, 72.
- 551 Sergio Di Franco, Transcript, August 17, 2011, pp. 64–65.
- 552 Sergio Di Franco, Transcript, August 17, 2011, pp. 65, 67.
- 553 Exhibit 1375, pp. 5–6; Exhibit 1374
- 554 Transcript, August 17, 2011, p. 67.
- 555 Sergio Di Franco, Transcript, August 17, 2011, p. 63.
- 556 Sergio Di Franco, Transcript, August 17, 2011, p. 68.
- 557 Peter Ross, Transcript, August 17, 2011, p. 70.
- 558 Bruce Reid, Transcript, August 17, 2011, p. 71.
- 559 Exhibit 1374; Exhibit 1375.
- 560 Transcript, August 17, 2011, pp. 73–74.
- 561 Exhibit 1376.
- 562 Transcript, August 17, 2011, pp. 74–75; Exhibit 1376.
- 563 Transcript, August 17, 2011, pp. 75–76.
- 564 Sergio Di Franco, Transcript, August 17, 2011, p. 76–78, 80; Peter Ross, Transcript, August 17, 2011, p. 79.
- 565 Transcript, August 17, 2011, p. 71.
- 566 Sergio Di Franco, Transcript, August 17, 2011, pp. 59–60; Bruce Reid, Transcript, August 17, 2011, pp. 60–61.
- 567 Peter Ross, Transcript, August 17, 2011, p. 89; Bruce Reid, Transcript, August 17, 2011, p. 90; Exhibit 1379, p. 7.
- 568 Sergio Di Franco, Transcript, August 17, 2011, p. 83.
- 569 Transcript, August 17, 2011, pp. 83–84.
- 570 Exhibit 1377, pp. 2–3; Exhibit 1379, p. 8.
- 571 Transcript, August 17, 2011, pp. 61–63.
- 572 Transcript, August 17, 2011, p. 71.
- 573 Bruce Reid, Transcript, August 17, 2011, p. 90; Exhibit 1379, p. 9.
- 574 Transcript, August 18, 2011, p. 28.
- 575 Bruce Reid, Transcript, August 17, 2011, p. 91.
- 576 Transcript, August 17, 2011, pp. 61–63.
- 577 Transcript, August 18, 2011, p. 25.
- 578 Exhibit 1395.
- 579 Robin Brown, Transcript, August 18, 2011, p. 56; Exhibit 1395.
- 580 See, e.g., Dick Beamish, David Welch, and Stuart McKinnell, Transcript, July 7, 2011, pp. 19–23; Exhibit 131, p. 11; Exhibit 748; Exhibit 759; Exhibit (Exhibit A, p. 5); Randall Peterman, Transcript, May 2, 2011, pp. 84, 87; David Welch, Transcript, July 7, 2011, pp. 21, 25–26; Stuart McKinnell, Transcript, July 7, 2011, p. 27, and Transcript, July 8, 2011, p. 57; Dick Beamish, Transcript, July 7, 2011, p. 25; Tim Parsons, Transcript, July 8, 2011, pp. 102–3, 108; Jim Irvine, Transcript, July 8, 2011, p. 108.
- 581 Transcript, September 23, 2011, pp. 16–19.
- 582 Transcript, September 23, 2011, p. 20.
- 583 Transcript, September 23, 2011, pp. 24–26, 33–34.
- 584 Exhibit 48. See also PPR 19, pp. 71–72.
- 585 Exhibit 48, p. 9.
- 586 Exhibit 1402, p. 27.
- 587 Transcript, August 18, 2011, pp. 78–79.
- 588 Transcript, August 18, 2011, p. 67.
- 589 Transcript, August 18, 2011, pp. 67–68, 70.
- 590 Exhibit 1400, pp. 34–36.
- 591 Robin Brown, Transcript, August 18, 2011, pp. 69–70.
- 592 Exhibit 1403, p. 13.
- 593 Robin Brown, Transcript, August 18, 2011, pp. 78–79. DFO’s response is found at p. 15 of Exhibit 1403.
- 594 Transcript, August 18, 2011, p. 68.
- 595 Transcript, September 23, 2011, p. 17.
- 596 Transcript, August 18, 2011, pp. 69–70, 74; Exhibit 1400, pp. 3–4, 32, 34–36.
- 597 Exhibit 40, pp. 8–9.
- 598 Transcript, August 18, 2011, pp. 71–72.
- 599 Robin Brown, Transcript, August 18, 2011, p. 73. See also John Ford, Transcript, May 4, 2011, p. 91.
- 600 Transcript, August 18, 2011, p. 80.
- 601 See also PPR 19, pp. 72–78.
- 602 PPR 19, p. 75.
- 603 PPR 19, pp. 75–76.
- 604 Exhibit 1363 (Exhibit C, pp. 2 and 5); Jack Rensel, Transcript, August 17, 2011, pp. 9, 38, 42, 44; Robin Brown, Transcript, August 18, 2011, pp. 62–63; Exhibit 1397; Exhibit 1417.
- 605 Robin Brown, Transcript, August 18, 2011, p. 63.
- 606 Transcript, August 18, 2011, p. 95.
- 607 Exhibit 1417.
- 608 Transcript, September 23, 2011, p. 26.
- 609 Exhibit 1359, p. 112; Transcript, August 17, 2011, p. 43.
- 610 Robin Brown, Transcript, August 18, 2011, pp. 63–64; Exhibit 1398, p. 12.
- 611 Exhibit 1399, p. 10.
- 612 Robin Brown, Transcript, August 18, 2011, p. 95; Exhibit 1371.
- 613 Laura Richards, Transcript, September 23, 2011, p. 29.
- 614 Robin Brown, Transcript, August 18, 2011, p. 65.
- 615 Transcript, September 23, 2011, pp. 27–28.
- 616 Transcript, August 17, 2011, p. 52.
- 617 Transcript, August 18, 2011, p. 96.
- 618 Robin Brown, Transcript, August 18, 2011, p. 66.
- 619 Jack Rensel, Transcript, August 17, 2011, pp. 9, 14, 31, 41–42; Exhibit 1363 (Exhibit C, p. 3). See also Exhibit 73, pp. 74–75; Exhibit 1359, pp. 111–12; Exhibit 1364; and Exhibit 1365 for suggestions as to how this research and monitoring could be done.
- 620 Jack Rensel, Transcript, August 17, 2011, p. 49; Robin Brown, Transcript, August 18, 2011, p. 104.
- 621 *Oceans Act*, ss. 29–36. See also PPR 19, pp. 50–72.
- 622 Exhibit 654, p. 5. See also PPR 19, p. 57.
- 623 Exhibit 263.
- 624 Exhibit 654, p. 9.
- 625 Bruce Reid, Transcript, August 18, 2011, p. 5; Exhibit 1382.
- 626 PPR 19, p. 50.
- 627 Exhibit 654, p. 9.
- 628 Exhibit 263, p. 4.
- 629 Robin Brown, Transcript, August 18, 2011, p. 51; Exhibit 263, p. 1.
- 630 Exhibit 263, pp. 12, 22–25.
- 631 Exhibit 263, pp. 12–13.
- 632 Exhibit 263, p. 14.
- 633 Bruce Reid, Transcript, August 17, 2011, p. 97.
- 634 Exhibit 263, p. 21.
- 635 Transcript, August 18, 2011, pp. 51–54.
- 636 Exhibit 1390, p. 5.
- 637 Exhibit 1390, pp. 15–16.
- 638 PPR 19, p. 56.
- 639 PPR 19, pp. 56–57.
- 640 PPR 19, p. 64.
- 641 Bruce Reid, Transcript, August 18, 2011, p. 8; PPR 19, p. 65; Exhibit 1385, p. 3; Exhibit 1384, p. 5; Exhibit 1346, p. 15.

- 642 PPR 19, p. 66.
- 643 Transcript July 4, 2011, p. 68.
- 644 Marcel Shepert, Ernie Crey, and Ross Wilson, Transcript, July 4, 2011, p. 68.
- 645 Transcript, July 4, 2011, p. 79.
- 646 Heiltsuk Tribal Council's written submissions, pp. 33–34, available at www.cohencommission.ca.
- 647 First Nations Coalition's written submissions, pp. x–xi, available at www.cohencommission.ca.
- 648 Public submission 0838–WARES, available at www.cohencommission.ca.
- 649 PPR 19, pp. 31–32. See also pp. 31–41.
- 650 *Canadian Environmental Protection Act, 1999* [CEPA], s. 122.1; PPR 19, p. 32.
- 651 CEPA, Part 7.
- 652 PPR 19, p. 34.
- 653 *Disposal at Sea Regulations*, SOR/2001–275; *Regulations Respecting Applications for Permits for Disposal at Sea*, SOR/2001–276; CEPA, Part 7, Division 3.
- 654 CEAA, s. 5(1)(d); *Law List Regulations*, SOR/94–636; PPR 19, p. 36.
- 655 PPR 19, pp. 38–39; CEPA, Schedule 6, para. 11.
- 656 CEPA, Schedule 6, para. 18.
- 657 PPR 19, p. 40.
- 658 PPR 19, p. 40; CEPA, s. 132.
- 659 *Species at Risk Act*, SC 2002, c. 29.
- 660 PPR 19, pp. 40–41.
- 661 Canada's written submissions, pp. 90–91, available at www.cohencommission.ca.
- 662 Canada's written submissions, p. 92, available at www.cohencommission.ca.
- 663 PPR 14, pp. 46–47.
- 664 Public submissions 0016–STOCK, 0101–GIBERSON, 0246–SEIOBC, 228825, 0250–MCISAAC, available at www.cohencommission.ca; presentations by George M. George Sr. (Prince George Public Forum, September 21, 2010), Tanis Reynolds (Prince George Public Forum), Bill White (Prince Rupert Public Forum, September 1, 2010), David Beach (New Westminster Public Forum, September 20, 2010) and Cliff Arrouse (Kamloops Public Forum, October 21, 2010), summaries available at www.cohencommission.ca; see also related submissions on municipal wastewater, pesticides, and greywater in Volume 2 of this Report.
- 665 *Canada Water Act*, RSC 1985.
- 666 Exhibit 689; Exhibit 690.
- 667 CEPA, ss. 77(2), 90(1).
- 668 *Canada Water Act*, s.11.
- 669 *Canada Water Act*, s.11(2)(a); see also *State of Freshwater Ecosystems* (2007), p. 108.
- 670 PPR 15, pp. 24–25.
- 671 PPR 14, p. 58.
- 672 CEPA, s. 44.
- 673 Exhibit 986, p. 2.
- 674 Exhibit 973, p. 1; Andre Talbot, Transcript, June 6, 2011, pp. 24–25.
- 675 John Carey, Transcript, June 7, 2011, p. 5; Exhibit 992, pp. 10–24; Schedule B sets out the monitoring sites in British Columbia and what is measured at the sites.
- 676 John Carey, Transcript, June 7, 2011, pp. 7, 14; Exhibit 977; Robie Macdonald, Transcript, June 6, 2011, p. 16; Peter Ross, Transcript, June 14, 2011, p. 87; Don MacDonald, Transcript, May 9, 2011, pp. 13–14. Mr. MacDonald (Technical Report 2 author) also stated that he is not aware of any water quality monitoring program designed explicitly for Fraser River sockeye salmon.
- 677 John Carey, Transcript, June 7, 2011, pp. 9–10; Exhibit 993, p. 6.
- 678 John Carey, Transcript, June 7, 2011, pp. 14–15.
- 679 Robie Macdonald, Transcript, June 6, 2011, pp. 12 and 17; John Carey, Transcript, June 7, 2011, p. 11.
- 680 Exhibit 1396, p. 7.
- 681 Exhibit 263, p. 23; s. 32 of the *Oceans Act* empowers the minister of fisheries and oceans to establish marine environmental quality guidelines, objectives, and criteria respecting estuaries, coastal, and marine waters.
- 682 Peter Ross, Transcript, August 17, 2011, p. 97.
- 683 Transcript, June 7, 2011, p. 72.
- 684 Lisa Walls, Transcript, June 6, 2011, p. 82; Exhibit 987; see also PPR 14, pp. 54–55.
- 685 Lisa Walls, Transcript, June 6, 2011, p. 81.
- 686 Lisa Walls, Transcript, June 6, 2011, pp. 81, 84.
- 687 Exhibit 689; Lisa Walls, Transcript, June 6, 2011, pp. 82–83; Exhibit 690.
- 688 Lisa Walls, Transcript, June 6, 2011, p. 85; Exhibit 988.
- 689 Lisa Walls, Transcript, June 6, 2011, pp. 90, 91, 92.
- 690 Transcript, June 7, 2011, p. 2.
- 691 Transcript, August 17, 2011, p. 60.
- 692 Transcript, June 14, 2011, p. 85.
- 693 Transcript, August 18, 2011, pp. 41–42.
- 694 Peter Ross, Transcript, June 14, 2011, p. 85; Transcript, August 18, 2011, pp. 41–42.
- 695 Peter Ross, Transcript, August 18, 2011, pp. 41–42.
- 696 Transcript, August 18, 2011, p. 42.
- 697 Transcript, August 17, 2011, p. 95.
- 698 Peter Ross, August 18, 2011, p. 31.
- 699 Transcript, June 6, 2011, pp. 12–13.
- 700 See discussion below; see also Claire Dansereau, Transcript, September 22, 2011, pp. 35–36.
- 701 Robie Macdonald, Transcript, June 6, 2011, pp. 11, 50; Sylvain Paradis, Transcript, June 7, 2011, p. 34; Robin Brown, Transcript, August 18, 2011, pp. 60–61; Exhibit 976; Exhibit 995, p. 16.
- 702 Lisa Walls, Transcript, June 6, 2011, pp. 76–77; Graham van Aggelen, Transcript, June 14, 2011, p. 68.
- 703 Transcript, June 7, 2011, p. 82; Exhibit 980, p. 3.
- 704 Transcript, June 6, 2011, pp. 19–20, 24–25.
- 705 Exhibit 982, p. 6; Exhibit 995, pp. 2–4; PPR 14, pp. 54–55; Robie Macdonald, Transcript, June 6, 2011, p. 12; see also Exhibit 979; Exhibit 1960.
- 706 Transcript, June 7, 2011, p. 64.
- 707 Transcript, June 7, 2011, pp. 81–82; Exhibit 980, p. 2.
- 708 Transcript, September 22, 2011, p. 37.
- 709 Transcript, September 22, 2011, pp. 37, 39–40.
- 710 Exhibit 1394, p. 26.
- 711 Transcript, August 18, 2011, pp. 57–58.
- 712 Transcript, August 18, 2011, p. 58.
- 713 Exhibit 1394, pp. 6–7.
- 714 Exhibit 1394, p. 30.
- 715 Exhibit 1394, p. 31.
- 716 Transcript, August 18, 2011, p. 56.
- 717 See, e.g., Peter Ross, Transcript, June 14, 2011, pp. 80–81.
- 718 Exhibit 980; Exhibit 995; PPR 14, pp. 55–56.
- 719 Sylvain Paradis, Transcript, June 7, 2011, p. 24; Robie Macdonald, Transcript, June 6, 2011, p. 35.
- 720 Sylvain Paradis, Transcript, June 7, 2011, pp. 24–25, 28; Robie Macdonald, Transcript, June 6, 2011, pp. 5, 6, 12, 17, 37–38.
- 721 Sylvain Paradis, Transcript, June 7, 2011, pp. 25, 49.
- 722 Sylvain Paradis, Transcript, June 7, 2011, pp. 26–27; John Carey, Transcript, June 7, 2011, p. 27.
- 723 Transcript, June 7, 2011, pp. 27, 43.
- 724 Robie Macdonald, Transcript, June 6, 2011, pp. 5–6, 7–8; Sylvain Paradis, Transcript, June 7, 2011, pp. 29, 48, 51–52; Exhibit 981, p. 9.
- 725 Sylvain Paradis, Transcript, June 7, 2011, pp. 52–53.
- 726 Robie Macdonald, Transcript, June 6, 2011, pp. 10–11; Sylvain Paradis, Transcript, June 7, 2011, p. 34; Peter Ross, Transcript, June 14, 2011, pp. 79, 82; Transcript, August 18, 2011, p. 27; Exhibit 976; Exhibit 995, p. 16.
- 727 John Carey, Transcript, June 7, 2011, pp. 41, 42.

- 728 John Carey, Transcript, June 7, 2011, pp. 44–44.
 729 Transcript, June 14, 2011, pp. 67–68.
 730 Transcript, June 14, 2011, pp. 79–80.
 731 Transcript, June 6, 2011, pp. 11, 38.
 732 Transcript, June 6, 2011, pp. 8–9, 38–39; see also Peter Ross, Transcript, June 14, 2011, p. 78.
 733 Transcript, August 17, 2011, p. 93, other than a small program Dr. Ross has with Chris Kennedy at SFU looking at the effect of single pesticide exposures to salmon.
 734 Transcript, September 22, 2011, p. 43.
 735 Peter Ross, Transcript, June 14, 2011, pp. 6, 40–39.
 736 Transcript, September 22, 2011, pp. 41–43.
 737 André Talbot, Transcript, June 6, 2011, pp. 24, 25; however, see Robie Macdonald, Transcript, June 6, 2011, p. 27 (Environment Canada is weak in marine system expertise).
 738 Robie Macdonald, Transcript, June 6, 2011, p. 23; André Talbot, Transcript, June 6, 2011, p. 24.
 739 André Talbot, Transcript, June 6, 2011, p. 29; John Carey, Transcript, June 7, 2011, p. 37.
 740 Transcript, June 6, 2011, pp. 26, 29.
 741 Peter Ross, Transcript, June 14, 2011, p. 83; Peter Ross, Transcript, August 17, 2011, pp. 86, 88; Transcript, August 18, 2011, p. 26; Graham van Aggelen, Transcript, June 14, 2011, pp. 83–84; Sylvain Paradis, Transcript, June 7, 2011, p. 84; Claire Dansereau, Transcript, September 22, 2011, p. 39; Exhibit 1377; Exhibit 1378, p. 1.
 742 Robie Macdonald, Transcript, June 6, 2011, p. 28; Sylvain Paradis, Transcript, June 7, 2011, p. 35.
 743 Transcript, September 22, 2011, p. 35.
 744 Robie Macdonald, Transcript, June 6, 2011, pp. 17–18; see also PPR 14, pp. 59–61.
 745 Robie Macdonald, Transcript, June 6, 2011, p. 62.
 746 Robie Macdonald, Transcript, June 6, 2011, p. 18.
 747 Transcript, June 14, 2011, p. 59.
 748 Peter Ross, Transcript, June 14, 2011, pp. 79–80.
 749 Robie Macdonald, Transcript, June 6, 2011, p. 28; André Talbot, Transcript, June 6, 2011, p. 29; John Carey, Transcript, June 7, 2011, p. 15; see also Peter Ross, Transcript, June 14, 2011, pp. 23, 65; James Arnott, Transcript, June 15, 2011, pp. 68, 69.
 750 Sylvain Paradis, Transcript, June 7, 2011, p. 16.
 751 André Talbot, June 6, 2011, pp. 18–19; Robie Macdonald, Transcript, June 6, 2011, p. 19; Graham van Aggelen, Transcript, June 14, 2011, p. 68.
 752 Robie Macdonald and André Talbot, Transcript, June 6, 2011, p. 74.
 753 Sylvain Paradis, Transcript, June 7, 2011, pp. 17, 21; John Carey, Transcript, June 7, 2011, pp. 17–18, 21; Peter Ross, Transcript, June 14, 2011, p. 83; Graham van Aggelen, Transcript, June 14, 2011, pp. 83–84; Exhibit 994.
 754 John Carey, Transcript, June 7, 2011, pp. 18, 19–20.
 755 Robie Macdonald, Transcript, June 6, 2011, pp. 12–13; John Carey, Transcript, June 7, 2011, pp. 78, 79–80, 85–86; Sylvain Paradis, June 7, 2011, p. 78.
 756 Sylvain Paradis, June 7, 2011, p. 80; John Carey, Transcript, June 7, 2011, pp. 80–81 (agreed about collaboration, but suggested that DFO should be the lead because it is responsible for population-level impacts on fish).
 757 Exhibit 833, p. 37; see also PPR 14, pp. 61–64.
 758 Public submissions 0020–JUDD, 0246–SEIOBC_228825 (Social Ecology Institute of BC), 250–MCISAAC and 0527–JUDD, available at www.cohencommission.ca; presentation by Zvonko Bezvak (Chilliwack Public Forum, September 29, 2010), summary available at www.cohencommission.ca.
 759 Don MacDonald, Transcript, May 9, 2011, pp. 91–92; Exhibit 826, pp. 34–36.
 760 Transcript, June 14, 2011, p. 30.
 761 Exhibit 826, pp. 36–38.
 762 Exhibit 997, p. 7.
 763 RSC 1985, c. F-27; PPR 14, pp. 62–63.
 764 *Integrated Pest Management Act*, SBC 2003, c. 58 (IPMA).
 765 PPR 14, p. 63.
 766 IPMA, s. 4, and *Integrated Pest Management Regulation*, BC Reg. 604/2004 [IPMR], ss. 5–6.
 767 Don MacDonald, Transcript, May 9, 2011, pp. 50–51
 John Carey, Transcript, June 7, 2011, p. 39; Exhibit 997.
 768 IPMR, s. 39.
 769 IPMA, s. 17, and IPMR, ss. 35–37.
 770 IPMR, s. 34; Transcript, June 7, 2011, p. 39.
 771 John Carey, Transcript, June 7, 2011, pp. 39–40; Don MacDonald, Transcript, May 9, 2011, pp. 52–53.
 772 Peter Ross, Transcript, June 14, 2011, p. 13; André Talbot, Transcript, June 6, 2011, pp. 30–31; John Carey, Transcript, June 7, 2011, p. 38.
 773 Robie Macdonald, Transcript, June 6, 2011, p. 28.
 774 Transcript, June 6, 2011, p. 31.
 775 PPR 14, p. 66; see also PPR 14, pp. 66–68; PPR 19, pp. 22–23.
 776 *Canada Shipping Act, 2001*, SC 2001, ss. 26, 187, and 190(1); *Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals*, SOR/2007–86
 777 *Municipal Sewage Regulation*, BC Reg. 129/99, s. 1.
 778 PPR 19, p. 23; PPR 14, p. 66.
 779 PPR 14, p. 67.
 780 Exhibit 1052, pp. 1–2, 10–11; Ken Ashley, Transcript, June 14, 2011, p. 36.
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 883 Exhibit 1362C, pp. 3–4.
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 909 *Mines Act*, s. 34, and *Health, Safety and Reclamation Code for Mines in British Columbia* (Health, Safety and Reclamation Code), s. 1.1.1.
 910 PPR 15, p. 86.
 911 Health, Safety and Reclamation Code.
 912 EMA, s. 14(1).

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 916 Exhibit 1032, p. 5.
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 918 Exhibit 1032, pp. 22–30 (Table C1, Table C2); PPR 15, p. 105.
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Chapter 7 • Enforcement: fisheries and habitat

In this Commission's Terms of Reference, I am directed to consider the Department of Fisheries and Oceans' (DFO's) policies and practices with respect to the Fraser River sockeye salmon fishery, including its management practices and procedures relating to enforcement.¹ As discussed in Chapter 3, Legal framework, the *Fisheries Act* and its related regulations create prohibitions relating to fishing and to fish habitat. In this chapter, I describe DFO's enforcement of the *Fisheries Act* concerning fisheries, fish habitat, and aquaculture.

DFO's enforcement activities are of concern to the public, and I received several submissions, both by email and at public forums, some of which I summarize below:

- People in the communities tell us that when they fish for food, they regularly encounter DFO's Conservation and Protection staff but seldom see or hear of on-the-water checks or checks of vehicles headed east, some of them with freezers full of fish on their trucks.²
- There is confusion over and a loss of confidence in DFO regarding who to call if there is a "fish kill" or fish habitat destruction.³
- The enforcement and prosecution arm of DFO should be separated from the rest of the organization and given a budget that would put it out of reach of the federal government's political interference.⁴
- There should be legislation to allow private prosecutions under the *Fisheries Act* because the Act is often unenforced.⁵
- Fishery officers are unable to respond to issues on the Fraser River because there are too few of them.⁶
- DFO should be required to make enforcement decisions based on science rather than politics.⁷
- Enforcement must be enhanced.⁸
- High-seas overfishing by foreign nations has decimated our stocks.⁹

■ The legal framework of enforcement: fisheries and fish habitat

It is an offence to contravene the *Fisheries Act* and its regulations, which include prohibitions relating to fishing, as well as to fish habitat.¹⁰ Fish habitat is a broad concept. The *Fisheries Act* defines “fish habitat” as “spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes[.]”¹¹

Fisheries prohibitions

The *Fisheries Act* sets out various prohibitions relating to fishing, including but not limited to no fishing during closed fishing times, no unattended fishing gear, no unlawful sale or possession of fish, and no contravention of a fishing plan.¹²

The *Fishery (General) Regulations*¹³ apply to fishing and related activities (with some limits*) and cover a number of topics, such as

- requirements to carry and produce a fishing licence and registration (sections 11–12);
- conditions that may be attached to a licence (section 22);
- suspension or cancellation of licences (section 24);
- identification of fishing vessels and gear (sections 26–29);
- release of incidental catch (section 33);
- no dumping and wasting of fish (section 34);
- restrictions on the sale of fish (section 35);
- requirement to identify, count, weigh, and measure fish (section 36);
- variation in close times, fishing quotas, and size and weight limits of fish (Part I);
- designation and duties of observers (Part V);
- requirements to assist persons engaged in enforcement or administration of the *Fisheries Act* (Part VI);
- ticketable offences (Part XII); and

- Canadian jurisdiction vessels fishing in waters other than Canadian fisheries waters (Part XIII).

Under subsection 35(2) of the *Fishery (General) Regulations*, a person is prohibited from buying, selling, trading, bartering, or offering to buy, sell, trade, or barter any fish “unless it was caught and retained under the authority of a licence issued for the purpose of commercial fishing, a licence issued under Part VII [fishing for experimental, scientific, educational, or public display purposes], or a licence issued under the *Aboriginal Communal Fishing Licences Regulations* in which the minister has authorized the sale of fish ...” This is the subsection which prohibits the sale of any fish not caught pursuant to a licence that authorizes sale. Aboriginal food, social, and ceremonial (FSC) fishing licences do not authorize sale, and so those fish may not be sold. (Food, social, and ceremonial fishing is discussed in detail in chapters 3, Legal framework, and 5, Sockeye fishery management.)

The *Pacific Fishery Regulations, 1993*,¹⁴ apply to the commercial fishery and set out the requirement for registration of commercial fishing vessels and licensing of fishers (sections 22–26). Part I of these regulations contains general prohibitions on the manner of fishing,¹⁵ and Part VI outlines salmon-specific prohibitions, including the following:

- no driving salmon from one area to another (section 51);
- no fishing for salmon in certain closed areas (section 52);
- no fishing for salmon during closed times (section 53);
- restrictions as to gear type and size (sections 54, 57, 60);
- no retention of salmon below a minimum size (section 55); and
- no unattended or anchored gillnets (section 57).

The *British Columbia Sport Fishing Regulations, 1996*,¹⁶ apply to sport fishing in Canadian fisheries waters in the Pacific Ocean (with some limits as per

* However, parts of the *Fishery (General) Regulations*, including those dealing with the transfer of ownership, loss of vessel, and the identification of fishing vessels and fishing gear, do not apply to fishing and related activities under Aboriginal communal fishing licences; where there is an inconsistency between the *Fishery (General) Regulations* and a regulation specifically enumerated in subsection 3(4), such as the *Pacific Fishery Regulations, 1993*, the enumerated regulation will prevail.

section 3) and set out close times, fishing quotas, size limits, and other restrictions for all recreational salmon fisheries in British Columbia (sections 42–50). The *Aboriginal Communal Fishing Licences Regulations* (ACFLR)¹⁷ provide a licensing mechanism for Aboriginal fisheries and include licence conditions (section 5) and prohibitions (sections 7–9).

Part II of the *Foreign Vessel Fishing Regulations*¹⁸ applies to foreign fishing vessels and to any person on board a foreign fishing vessel (including crew or employees) in the Canadian fisheries waters adjacent to the Pacific Coast.¹⁹ Part II sets out close times for fishing certain species and areas, incidental catch limits, gear restrictions, and requirements for seals and certificates on gear.²⁰ Although the regulations specifically identify several species, they do not set out incidental catch limits, gear restrictions, or close times in respect of salmon. The *Coastal Fisheries Protection Act*²¹ regulates the activities of foreign fishing vessels in Canadian fisheries waters (for example, it restricts the entry of foreign fishing vessels into Canadian waters, foreign vessels fishing in Canadian waters, and the transport of fish into Canadian waters²²).

Fish habitat protection prohibitions

The *Fisheries Act* contains a number of fish and fish habitat protection provisions, but section 35 is the primary habitat protection provision, prohibiting the unauthorized carrying on of any work or undertaking that results in the “harmful alteration, disruption or destruction of fish habitat” (HADD). Under subsection 35(2), a HADD may occur with the minister’s authorization or pursuant to regulations:

35.

- (1) No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat.
- (2) No person contravenes subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under any conditions authorized by the Minister or under regulations made by the Governor in Council under this Act.

While DFO’s regulatory work focuses on section 35, it also considers other sections of the *Fisheries Act*’s “habitat protection and pollution prevention provisions.” These sections are summarized in Table 1.7.1.

Section 36 of the *Fisheries Act* prohibits the unauthorized deposit of a deleterious substance into water frequented by fish and is often referred to as the key “pollution prevention” provision. Although the minister of fisheries and oceans is ultimately responsible for all sections of the *Fisheries Act*, pursuant to an administrative agreement discussed below, Environment Canada, rather than DFO, administers and enforces aspects of pollution control arising from sections 36 through 42. Section 36 provides as follows:

36.

- (1) No one shall
 - (a) throw overboard ballast, coal ashes, stones or other prejudicial or deleterious substances in any river, harbour or roadstead, or in any water where fishing is carried on;
 - (b) leave or deposit or cause to be thrown, left or deposited, on the shore, beach or bank of any water or on the beach between high and low water mark, remains or offal of fish or of marine animals; or
 - (c) leave decayed or decaying fish in any net or other fishing apparatus.
- (2) Remains or offal described in subsection (1) may be buried ashore, above high water mark.
- (3) Subject to subsection (4), no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water.
- (4) No person contravenes subsection (3) by depositing or permitting the deposit in any water or place of
 - (a) waste or pollutant of a type, in a quantity and under conditions authorized by regulations applicable to that water or place made by the Governor in Council under any Act other than this Act; or

(b) a deleterious substance of a class, in a quantity or concentration and under conditions authorized by or pursuant to regulations applicable to that water or place or to any work or undertaking or class

thereof, made by the Governor in Council under subsection (5).

(5) The Governor in Council may make regulations for the purpose of paragraph (4)(b)
...

Table 1.7.1 DFO's summary of the Habitat Protection and Pollution Prevention provisions of the Fisheries Act

Section	Authority
20	The Minister may require fish-ways to be constructed.
21	The Minister may authorize payment, order construction or removal or require fish stops or diverters for fish-ways.
22	The Minister may require sufficient flow of water for the safety of fish and flooding of spawning grounds as well as free passage of fish during construction.
26	Prohibits obstruction of fish passage through channels, rivers and streams. In addition, the Minister may authorize devices to prevent the escape of fish.
27	Prohibits the damage or obstruction of fish-ways, the impediment of fish to fish-ways and nearby fishing.
28	Prohibits the use of explosives to hunt or kill fish.
30	The Minister may require fish guards or screens to prevent the entrainment of fish at any water diversion or intake.
32	Prohibits the destruction of fish by any means other than fishing.
34	Definitions used throughout sections 35 to 42.
35	Prohibits works or undertakings that may result in harmful alteration, disruption or destruction of fish habitat, unless authorized by the Minister or under regulations.
36	Prohibits the deposit of deleterious substances into waters frequented by fish, unless authorized under regulations.
37	The Minister may request plans and specifications for works or undertakings that might affect fish or fish habitat. The Minister may, by regulations or with Governor-in-Council approval, make orders to restrict or close works or undertakings that may harmfully alter fish habitat or lead to the deposit of deleterious substances.
38	Gives the Minister the authority to appoint inspectors and analysts and describes inspectors' powers, including entry, search and the power to direct preventive, corrective or cleanup measures. Provides for regulations that require reporting of abnormal deposits of a deleterious substance or substances that occur in contravention of the general prohibition, regulations or site-specific authorizations.
40	Sets out penalties in case of a contravention of: sections 35 or 36; failing to provide information or to undertake a project in compliance with section 37; or failing to make a report or to otherwise comply with section 38.
42	Those causing the deposit of deleterious substances in waters frequented by fish are liable for costs incurred by Her Majesty. Also, the Minister shall prepare an annual report on administration and enforcement of the fish habitat protection and pollution prevention provisions of the Fisheries Act as well as a statistical summary of convictions under section 42.1.
43	The Governor in Council may make regulations for carrying out the purposes and provisions of the Fisheries Act, including habitat protection and pollution prevention.

Source: Policy and Practice Report 8, Habitat Management, p. 5; 2008–2009 Annual Report to Parliament on the Administration and Enforcement of the Fish Habitat Protection and Pollution Prevention Provisions of the Fisheries Act (2010), online: <http://www.dfo-mpo.gc.ca/habitat/role/141/reports-rapports/2008-2009/pdf/ann08-eng.pdf>, p. 7.

Contraventions of subsections 35(1) or 36(1) or 36(3) of the *Fisheries Act* may be prosecuted as summary or indictable offences. The potential penalties for summary offences are fines up to \$300,000 and/or six months' imprisonment; for indictable offences, fines up to \$1 million and/or imprisonment for up to three years could be imposed.²³

Additionally, subsections 42(1) and 42(2) provide for civil liability for damages (monetary payment) to the Crown (either federal or provincial) incurred in mitigation or remediation of any deposits of deleterious substances contrary to section 36. Subsection 42(3) makes the persons who own, have charge of, or cause or contribute to the deposit or danger of a deleterious substance that enters waters frequented by fish contrary to section 36, liable to licensed commercial fishermen for all loss of income incurred "as a result of the deposit or of a prohibition to fish resulting therefrom ..."²⁴

I note that Part 3, Division 5, of Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which received royal assent on June 29, 2012, amends the *Fisheries Act*, sections 2, 20–21, 35–40, 42.1, 43, 63, and 82, and repeals sections 26–27, 30, 32, and 69. In addition, the bill adds sections 39, 43.1, 43.2, and 89–91. In Volume 3, Chapter 3, Legislative amendments, I summarize and address the possible implications of the proposed changes in light of the evidence, findings, and recommendations arising from the Commission's hearings.

Some of the amendments, are likely to affect DFO and Environment Canada's management of enforcement as described in Volume 1, Chapter 3, Legal framework, including in the following ways:

- The sections regarding fishways and obstructions are reorganized and reworded (sections 20–21).
- Section 32, which prohibits the killing of fish by means other than fishing, is changed to broaden the exceptions to the prohibition. Bill C-38 also allows cabinet to repeal this provision at any time.
- The prohibition in subsection 35(1) is amended; there are more categories of exceptions to subsection 35(1); and a new subsection 35(3) allows the minister to make regulations authorizing exceptions to subsection 35(1).
- Changes to section 36 allow the minister to make regulations that except the application of subsection 36(3).

- Powers of fishery officers and inspectors are expanded (sections 38–39).
- New offences and fines are created under section 40.
- There are new categories of regulations under section 43, including regulations providing for the control and management of aquatic invasive species.
- A new subsection 43.2 allows cabinet to designate a minister other than the minister of fisheries and oceans as the minister responsible for the administration and enforcement of subsections 36(3) through (6) of the *Fisheries Act* for the purposes of, and in relation to, subject matters set out by order.

■ Relationship between DFO and Environment Canada

On April, 17, 1978, Prime Minister Pierre Elliott Trudeau issued a prime ministerial directive that formalized the existing arrangements between DFO and Environment Canada: DFO took the administrative lead with respect to section 35, and Environment Canada took the administrative lead with respect to section 36, except where sediment has been deposited into fish-bearing waters, in which case DFO is the lead agency.²⁵

In May 1985, DFO and Environment Canada signed a Memorandum of Understanding on the Subject of the Administration of Section 33 [now section 36] of the *Fisheries Act* (1985 MOU).²⁶ The 1985 MOU set out the parties' agreement formalizing their roles.

As required under the 1985 MOU, in 1987, Environment Canada and DFO signed a regional working agreement (Regional Working Agreement, or 1987 RWA).²⁷ The stated purpose of this agreement is to identify Environment Canada's and DFO's "roles and responsibilities, procedures and guidelines and improve effective communications, coordination and cooperation between the departments for matters within the purview of Section 33 [now 36] in the Province of British Columbia and Yukon Territory."²⁸ The 1987 RWA provides for such things as annual reviews, arbitration procedures, technical roles, division of responsibilities for

inter-agency permit referrals, emergency responses, communications and enforcement, and compliance procedures.

The Regional Working Agreement says that “enforcement and compliance procedures will be consistent with the national enforcement and compliance policy currently under development” by Environment Canada, DFO, and the Department of Justice.²⁹ The Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* is discussed further below. This policy sets out general principles that govern application of sections 35 and 36 of the *Fisheries Act*, including the respective roles of Environment Canada and DFO.³⁰

Finally, the 1987 RWA notes the following:

Section 8 of the MOU provides DFO with the authority to take direct action in circumstances where the fisheries resource is being affected and where EP [Environmental Protection Directorate of Environment Canada] is unable or unwilling to take such action. It is anticipated that such direct action without some level of prior consultation with EP will be infrequent and would occur only as a result of unique circumstances.³¹

As noted above, Bill C-38 allows cabinet to designate a minister other than the minister of fisheries and oceans as the minister responsible for the administration and enforcement of subsections 36(3) through (6) of the *Fisheries Act*.

Interim Operational Working Arrangement on Enforcement of Section 36(3) *Fisheries Act*

In February 2006, Environment Canada and DFO in the Pacific and Yukon Region signed an Interim Operational Working Arrangement on Enforcement of Section 36(3) *Fisheries Act* between Environment Canada and Department of Fisheries and Oceans Pacific & Yukon (Interim Operational Working Arrangement on Enforcement of Section 36(3)).³² The agreement acknowledges and supplements the Regional Working Agreement discussed above. In the main, it sets out a response protocol for spills and subsection 36(3) enforcement.³³

The agreement sets out that “[i]f the spill is on land or from land into fresh water the lead agency is the Ministry of Environment,” but “[i]f the spill is related to a deposit of sediment (or a HADD) into fish bearing waters, DFO is the lead agency.”³⁴ It also provides that, when contacted by Environment Canada, DFO “will make every effort to assist,” performing such functions as a “first responder” role where it may not be practicable or possible for Environment Canada to attend at a scene.³⁵ Further, where a preliminary response has been completed by DFO, Environment Canada will assume responsibility for an investigation, though the two agencies may decide that it is “appropriate / desirable for DFO to assume responsibility as lead agency for the completion of the investigation up to and including prosecution.”³⁶

Enforcement of section 36 in relation to salmon farms

Although Environment Canada is responsible for the administration of section 36 of the *Fisheries Act*, under the federal *Pacific Aquaculture Regulations* (which are described in Chapter 3, Legal framework), Environment Canada is not designated as the agency to which salmon farms must report regarding their discharges. This arrangement differs from Environment Canada’s regulatory oversight provided in other regulations made pursuant to subsection 36(5) of the Act (see, e.g., the *Pulp and Paper Mill Effluent Regulations*³⁷ and *Metal Mining Effluent Regulations*³⁸). Also, I understand from testimony provided by Claire Dansereau, deputy minister, that DFO currently views itself as responsible for the application of section 36 to this industry.³⁹

Provincial laws and federal-provincial agreements

In freshwater habitats, DFO deals with enforcement relating to salmon and the province deals with enforcement for all other fish species.⁴⁰ According to Randy Nelson, regional director of Conservation and Protection, DFO Pacific Region, provincial involvement in enforcement activities is less likely in the marine environment.⁴¹

Environment Canada's role with respect to enforcement of subsection 36(3) does not change from freshwater to marine habitats.⁴²

In 2000, Canada and British Columbia signed a Fish Habitat Management Agreement (described in Chapter 6, Habitat management).⁴³ According to Mr. Nelson, fishery officers are trained to follow the principles expressed in this document and they "make it work at the field level."⁴⁴ Mr. Nelson said that, in his opinion, the working relationship between provincial conservation officers and fishery officers is very good.⁴⁵

In 2002, the British Columbia Conservation Officer Service and DFO Pacific Region's Conservation and Protection Branch signed a memorandum of understanding respecting mutual assistance.⁴⁶ Aside from clauses related to disclosure of documents or information, and to limitations on liability, the document is "not legally binding."⁴⁷ The agreement describes the good faith intentions of each service to assist one another in the field in both exigent and non-exigent situations and to consider a process for cross-designation of fishery officers as conservation officers and conservation officers as fishery officers. Mr. Nelson confirmed that, if something needs to be responded to right away, either fishery officers or conservation officers will do the initial response and gather the immediate information and evidence and then turn it over to the other agency.⁴⁸

There are no formal arrangements or agreements between Environment Canada and the province for enforcement purposes.⁴⁹

I note that Part 3, Division 5, of Bill C-38, discussed above, allows the minister of fisheries and oceans to enter into agreements with a province to further the purposes of the Act.⁵⁰ Also, if an agreement provides that there are provincial laws that are equivalent in effect to a provision in the regulations, then cabinet could declare, by order, that provisions of the Act or its regulations would not apply in the province.⁵¹ The amendments would also allow the minister to implement programs and projects for the purposes of the Act, and, in exercising these powers, the minister could enter into agreements, arrangements, or transactions with any person or body, or any federal or provincial minister, department, or agency.⁵²

■ Organizational structure

DFO's organizational structure

DFO's national Conservation and Protection Directorate (C&P), under the Ecosystems and Fisheries Management sector, is responsible for fisheries and habitat enforcement.⁵³ The director general of C&P, DFO's head enforcement officer, is responsible for promulgating policies and procedures to facilitate the national delivery of the C&P program, holding ultimate responsibility for the activities of more than 600 fishery officers stationed in 136 offices across Canada.⁵⁴ The director general reports to the assistant deputy minister, Ecosystems and Fisheries Management, and is assisted by a director of enforcement and a director of program support and development.⁵⁵ There is a functional relationship between regional C&P branches and C&P at DFO national headquarters, but no direct reporting relationship.⁵⁶ (For a detailed discussion of the organizational structure of C&P, see Chapter 4, DFO overview.)

In response to the Honourable Bryan Williams's report *2004 Southern Salmon Fishery Post-Season Review* (Williams Report)⁵⁷ and the 2005 *Report of the Standing Committee on Fisheries and Oceans*,⁵⁸ the DFO Pacific Region was reorganized so that the regional director, C&P, now reports directly to the regional director general.⁵⁹ (In the other five DFO regions, the regional director of C&P is part of the broader Fisheries and Aquaculture Management group within the region.⁶⁰) The Pacific regional director of C&P reports functionally to the director general of C&P in Ottawa and has line authority over all regional C&P resources.⁶¹ Regional directors are responsible for the regional delivery of the C&P program, which includes development and application of regional C&P policies and guidelines, regional C&P planning and priority setting, collaboration with partner agencies (such as the RCMP), and meeting the requirements of international enforcement agreements.

C&P is a largely decentralized organization, with a staff of less than 30 at DFO's national headquarters in Ottawa.⁶² In comparison, in 2009, Pacific Region C&P had approximately 34 different offices with between 161 and 180 fishery officers.⁶³ The Pacific Region consists of five management areas, each led by a C&P area chief who reports to

the regional director of C&P.⁶⁴ Area chiefs oversee detachment supervisors (there are 16 detachments divided among the five areas), who in turn oversee field supervisors, who in turn oversee general duty fishery officers.⁶⁵

In addition to area chiefs, the regional director of C&P has direct line-reporting relationships with eight regional chiefs and coordinators who oversee specific C&P activities, such as aquaculture enforcement, investigation and intelligence services, program integration, program planning and analysis, regulations, recruitment, community justice, and community enforcement.⁶⁶

Although C&P fishery officers enforce fisheries and habitat-related provisions of the *Fisheries Act*, responsibilities for habitat enforcement and compliance are shared with Habitat staff.⁶⁷ Habitat staff are the lead for education, promotion, and evaluation. C&P staff take the lead on enforcement.⁶⁸ Habitat and C&P staff work together on enforcement: the fishery officers are experts in procedures, prosecution, laying of information, and collection of evidence. However, according to Jason Hwang, area manager, Oceans, Habitat and Enhancement Branch, BC Interior, this work is carefully supported by Habitat staff, who appreciate the impacts on fish habitat and can provide evidence on them.⁶⁹

For 2009, 6 percent of C&P's total program effort, nationally, was spent on "habitat" initiatives, compared with 44 percent on commercial fishing, 23 percent on recreational fishing, and 10 percent on Aboriginal fishing. Other C&P program efforts nationally include work related to the Canadian Shellfish Sanitation Program, the seal hunt, foreign fishing, and the *Species at Risk Act*.⁷⁰

Fishery officers, fishery guardians, and inspectors

Fishery officers are DFO staff tasked with compliance and enforcement. Designated under subsection 5(1) of the *Fisheries Act*, fishery officers hold the powers and protections of peace officers under the *Criminal Code** while enforcing the *Fisheries Act*, the *Coastal Fisheries Protection Act*, certain First

Nations fisheries laws,⁷¹ and associated regulations. Enforcement training, knowledge of fisheries, and special certification are requirements for becoming a fishery officer.

The *Fisheries Act* allows the minister to designate people as "fishery officers," "fishery guardians," and "inspectors."⁷² Both fishery officers and fishery guardians have powers of inspection under the Act.⁷³ A fishery officer also has powers of search in certain circumstances.⁷⁴ Both fishery officers and fishery guardians may arrest without warrant a person whom they believe "on reasonable grounds, has committed an offence against this Act or any of the regulations" or who is in the process of committing such an offence.⁷⁵ They also both have a power of seizure with respect to "any fishing vessel, vehicle, fish or other thing that the officer or guardian believes on reasonable grounds was obtained by or used in the commission of an offence under this Act or will afford evidence of an offence under this Act."⁷⁶

Inspectors, appointed under section 38 of the Act, have limited powers of inspection (without a warrant) and search (with a warrant). As with fishery officers and fishery guardians, an inspector may search without a warrant only if there are exigent circumstances.⁷⁷ Inspectors do not have powers of arrest or seizure, but they have one power that fishery officers and fishery guardians do not have: the power to direct that immediate, "reasonable measures consistent with safety and with the conservation of fish and fish habitat" be taken to stop the "deposit of a deleterious substance in water frequented by fish or a serious and imminent danger thereof by reason of any condition."⁷⁸ Fishery officers who also have an inspector designation are able to issue inspector's directions.

As noted above, Bill C-38 expands the powers of inspectors and fishery officers.

Section 79.7 of the *Fisheries Act* addresses "ticketable offences" and provides that a fishery officer, fishery guardian, or inspector may commence proceedings in respect of any offence prescribed by regulations by way of a ticket. The ticketable offences include failing to produce a licence or fisher's registration card, leaving unattended fishing gear not

* As described by DFO, peace officer status under the *Criminal Code* is conferred on fishery officers only while performing duties or functions under the *Fisheries Act* or the *Coastal Fisheries Protection Act*; fishery officers do not have peace officer status while enforcing any other legislation (Exhibit 694, Draft National Enforcement Policy for Conservation and Protection, p. 10). A detailed table setting out fishery officer authorities under legislation administered by the DFO is set out in Exhibit 694, p. 7.

identified by the owner's name, failing to forthwith return fish to water, and failing to release fish in the least harmful manner.⁷⁹

The key activities of a field-level fishery officer include

- carrying out compliance inspections and enforcement of fisheries-related legislation that governs fishing activity and protects fish habitat and the aquatic environment;
- acting as lead investigator or as a member of a team of fishery officers to collect evidence, including forensic evidence on major cases, to prepare violation reports and court briefs, and to execute court documents and voluntary penalty tickets;
- promoting stewardship of the fisheries resources and fish habitat;
- investigating and gathering intelligence and/or conducting audits on fishing and habitat-related activities;
- participating in the development of training programs;
- developing and delivering public education and awareness presentations; and
- acting as a senior departmental liaison in communities and providing assistance to other federal, provincial, local, and international enforcement agencies.⁸⁰

Fishery officers spend a great deal of their time enforcing and monitoring compliance by patrolling on land, on water, and in the air.⁸¹ Patrols are the primary means to detect and deter non-compliance.⁸² According to Mr. Nelson, the presence of fishery officers "is one of the best deterrents [DFO has] ... The presence of a uniformed fishery officer in any fishery and in habitat cases, really it's the best tool [DFO has]."⁸³

The mandate of C&P and the areas of responsibility given to fishery officers have grown in recent years with the addition of the Canadian Shellfish Sanitation Program, federal aquaculture management and enforcement, the European Union traceability certificate auditing requirements, the increasing number of Aboriginal organizations with unique licence conditions, increasing catch monitoring requirements, and the increasing complexity of harvest management directions (with a shift toward stock-specific management).⁸⁴ As a

result, Mr. Nelson believes that "there's an ever-increasing amount of pressures and workloads put on officers."⁸⁵

Habitat fishery officers

Over the years there have been changes in how the habitat-related work is distributed among fishery officers. From 1999 to 2003, Pacific Region C&P identified a need for additional officers specializing in habitat and employed some dedicated "habitat" fishery officers, funded under the Habitat Conservation and Stewardship Program, who specialized in the investigation of HADDs.⁸⁶ (For further discussion see Chapter 6, Habitat management.) Currently, no fishery officers work exclusively on habitat, although in 2010, Pacific Region C&P dedicated some fishery officers to aquaculture positions after receiving funding to do so.⁸⁷ (For further discussion, see Chapter 8, Salmon farm management.) Mr. Nelson testified that specialized habitat fishery officers were very effective but that, with the current funding shortfalls, C&P could not include such positions.⁸⁸

Aboriginal fishery guardians

In December 1992, DFO announced the Aboriginal Guardian Program, a component of its Aboriginal Fisheries Strategy (AFS), administered through Aboriginal Fisheries Strategies agreements setting out the guardian's responsibilities and authorities, including monitoring and enforcement. Aboriginal guardians may be designated as fishery guardians by the minister under section 5 of the *Fisheries Act*. In 1992, DFO dedicated \$1.3 million to provide training and equipment for Aboriginal guardians in the Lower Fraser area and trained 81 Aboriginal guardians for British Columbia, with an additional 50 for 1993.⁸⁹

Rod Naknakim of the Laich-Kwil-Tach Treaty Society testified that, in his experience, the relationship between Aboriginal guardians and DFO was a good one and the guardians helped to build trust among Aboriginal fishers, commercial fishers, and DFO.⁹⁰ Ross Wilson of the Heiltsuk Integrated Resource Management Department told me that the Heiltsuk have Aboriginal guardians but no standard training, so they're not recognized as having a qualified training process.⁹¹

By the late 1990s, DFO had suspended the Aboriginal Guardian Program as a result of administrative and funding difficulties. By 2008 the number of Pacific Region Aboriginal fishery guardians (employed through AFS agreements) was 15, and by 2011, this number was further reduced to 11.⁹² Prior to 2010, after reviews of the program, DFO implemented retraining initiatives for Aboriginal guardians and a revitalization of the Aboriginal Guardian Program through its national Aboriginal Fisheries Guardian Review.⁹³

Environment Canada's organizational structure

Environment Canada's Enforcement Branch is responsible for the protection and conservation of both the environment and wildlife for future generations.⁹⁴ Enforcement officers enforce a variety of federal environmental and wildlife laws, including section 36 of the *Fisheries Act* as described above.

The Enforcement Branch is divided into the Environmental Enforcement Directorate (EED) and the Wildlife Enforcement Directorate, the former being the directorate relevant to the Commission's proceedings.⁹⁵ Environment Canada's EED is more centralized than DFO's C&P. In the BC and Yukon Region there are approximately 29 enforcement officers, including two in the Yukon office and 19 in Vancouver.⁹⁶ The environmental enforcement officers for the BC and Yukon Region report to three operational managers (or district managers): one for the Coastal District based out of Vancouver; one for the Southern Interior District, also based out of Vancouver; and one for the Central and Northern District.⁹⁷ The operational managers report to a regional director,* who reports to the national director of the Environmental Enforcement Directorate.⁹⁸ The national director reports to the chief enforcement officer, who in turn reports to the deputy minister of Environment Canada.⁹⁹ Regionally, the Enforcement Branch has four operational experts (or advisors or program liaisons), who report directly to the regional director.¹⁰⁰

Enforcement officers who work to enforce section 36 of the *Fisheries Act* must be designated as fishery officers under the *Fisheries Act*.

Work related to section 36 has been a top priority for the Environmental Enforcement Directorate for at least the seven years preceding the April 2011 hearings.¹⁰¹ Annually, Environment Canada carries out about 8,000 inspections under the *Canadian Environmental Protection Act, 1999* (CEPA)¹⁰² and the *Fisheries Act*. Between 2007 and 2011, 40–46 percent of inspections related to section 36.¹⁰³

In 2010, Environment Canada reported that work was under way to develop a Results-Based Management and Accountability Framework (RMAF) for its *Fisheries Act* responsibilities and to identify current risks and risk management activities.¹⁰⁴ It also reported that it has started developing a plan to update regulations, guidelines, and best management practices for its work under the *Fisheries Act*.¹⁰⁵

In 2007–8, the Enforcement Branch received \$22 million for two years, a sum that allowed it to hire 106 enforcement officers, 68 of whom are environmental enforcement officers. Nine of these officers were located in the Pacific and Yukon Region, mostly in British Columbia. Following this initial sum, Environment Canada received an additional \$21 million to build up the program to support the management of the Enforcement Branch.¹⁰⁶

■ Enforcement policies and practices

In order to provide context for the evidence of DFO and Environment Canada's management of fisheries and fish habitat enforcement, I first describe the key policies and practices governing these two departments' enforcement activities.

DFO's policy framework for enforcement and compliance

In its 2008–9 internal audit of C&P (National Directorate and regional branches), DFO acknowledged a lack of guiding policies for C&P and the resulting detrimental effect:

* As of March 2011, Marko Goluzza.

There are insufficient detailed policies and procedures in place, and inconsistencies in program delivery methods and procedures are evident. This reduces program effectiveness, increases risk, and may affect credibility with the general public, courts and other enforcement services.¹⁰⁷

Before the 2008–9 audit, DFO had produced a draft National Enforcement Policy for C&P,¹⁰⁸ as well as a National Compliance Framework¹⁰⁹ and a National Compliance Model¹¹⁰ (each discussed in turn below).

Paul Steele, the former director general of C&P, DFO, described the draft Enforcement Policy as a document that is currently under development by DFO, the intent of which is to provide a framework piece for enforcement and to “fill a gap that’s been identified in terms of C&P policies and procedures that are available nationally.”¹¹¹

According to this document, the draft policy focuses on providing guidance to fishery officers in the exercise of their enforcement powers, and in particular on providing policy guidance on the various courses of action available to officers in securing compliance with the law.¹¹² The draft policy applies on a wider basis than the Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* (see discussion below) to the full range of activities in which C&P is engaged. Once approved, it would apply to the national C&P program.¹¹³

In 2006–7, C&P developed its National Compliance Framework, the purpose of which is to “provide a solid foundation for the activities the department undertakes to achieve and maintain compliance.”¹¹⁴ The National Compliance Framework has eight underlying principles, which are to guide the application of compliance tools, organized into three pillars. The underlying principles are stated as follows:

- Proactive (promote voluntary compliance);
- Collaborative (build support through partnerships);
- Problem solving (special attention to specific problems);
- Risk based (effort and response proportional to risk);
- Innovative (optimize use of technology and other tools);

- Intelligence-led (increased role of intelligence and analysis in supporting enforcement operations);
- Cost efficient / effective (better use of resources);
- Balanced (appropriate mix of activities undertaken to achieve compliance).¹¹⁵

The National Compliance Framework articulates “three pillars of compliance management”:

- *Pillar One – Education and shared stewardship.* Includes informal and formal education of the public, co-management, and partnerships.
- *Pillar Two – Monitoring, control, and surveillance.* Includes patrols, inspections, third-party monitoring, inter-agency partnerships, and fishery officer responses to non-compliance.
- *Pillar Three – Major cases and special investigations.* Includes formal intelligence gathering and analysis, retroactive offence detection and investigation, and the use of specialized skills and technology.¹¹⁶

In conjunction with its National Compliance Framework, C&P developed its National Compliance Model (or National Situational Compliance Model), which is composed of four “rings” representing the regulatory framework, policy framework, monitoring and control and surveillance activities, and action / response activities.¹¹⁷ According to DFO, the “four layers of the national compliance model provide the elements required to deal with the full range of situational factors and client behaviour [and] [t]hey are incorporated in the National Compliance Framework as follows”: the regulatory / legal framework reflects the fundamental rationale and purpose of the National Compliance Framework; compliance and enforcement policies and arrangements are guided by the National Compliance Framework’s policy principles; and the monitoring, compliance, and surveillance activities and action / response activities of the model comprise the National Compliance Framework’s strategic support for specific compliance strategies in programs and regions.¹¹⁸ In the draft Enforcement Policy (discussed above), DFO sets out certain

guiding principles for fishery officers in the application of the National Compliance Model:

- compliance with fisheries laws is mandatory;
- in promoting compliance with fisheries laws officers will emphasize preventing violations;
- officers will apply fisheries laws in a manner that is fair, predictable, impartial, and consistent. They will use rules, and processes securely founded in law, in keeping with the Canadian Charter of Rights and Freedoms;
- a risk based approach will be applied whereby officers will respond to suspected violations of fisheries laws, giving priority to those that have resulted in the greatest harm, or pose the greatest risk of harm, to the fisheries resource, to fish habitat or to public health; and
- officers will encourage reporting by the public of suspected violations of fisheries laws, and will respond to all such requests in accordance with priorities established within Conservation and Protection.¹¹⁹

In addition to these national enforcement and compliance policies, a brief section on enforcement in DFO's 1993 Policy for the Management of Aboriginal Fishing provides that normal enforcement procedures will apply to Aboriginal fishing, subject to the terms of Aboriginal fishing agreements.¹²⁰

David Bevan, associate deputy minister, said that DFO focuses its compliance and enforcement efforts on Pillar One (education and shared stewardship) and Pillar Three (major cases and special investigations), and away from Pillar Two (patrol or monitoring, control, and surveillance) activities.¹²¹ Mr. Nelson, however, reiterated the importance of Pillar Two activities, saying that the presence of fishery officers "is the primary deterrent in any enforcement,"¹²² and that "field presence is the biggest deterrent you can have."¹²³ Despite the importance of patrols and on-the-water presence, C&P is moving toward increased attention to major cases and special investigations.¹²⁴ This shifting of priorities is being done despite Mr. Nelson's belief that the intelligence-led policing model will not "enable [C&P] to do the job with a lot less

resources."¹²⁵ However, Mr. Bevan disagreed with Mr. Nelson:

[W]e've tried to move to ... education and shared stewardship, bringing people along to understand the need for conservation, the need for compliance. Yes, we'll have monitoring, control and surveillance, but we also need major case investigations so that if you have a systemic problem in a location or in a particular component of fish harvesting and processing ... you spend the resources to get at that systemic problem.

...

I'm not saying that we're going to say we can get rid of lots of fishery officers by introducing new technologies, because here is an increasing workload. But I am saying that it's not a simple number of fishery officers versus what was in the past and what's coming in the future.¹²⁶

DFO and Environment Canada's policy framework for habitat-specific enforcement policies and practices

Compliance and Enforcement Policy

In 2001, DFO and Environment Canada jointly developed a national Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act* (Compliance and Enforcement Policy) in respect of sections 35 and 36 of the *Fisheries Act*.¹²⁷ The Compliance and Enforcement Policy lists its purpose as being to assist those "who administer the laws and those who must comply with them" to understand how the government intends to achieve compliance with sections 35 and 36 of the *Fisheries Act*.¹²⁸ It sets out general principles to govern application of the habitat protection and pollution prevention provisions.¹²⁹

The Compliance and Enforcement Policy discusses the responsibilities of DFO and Environment Canada, and the powers of fishery officers, fishery guardians, fishery inspectors, the Attorney General, and the courts.¹³⁰ It includes

measures to promote compliance.¹³¹ The policy also sets out two main types of enforcement activities under the habitat protection and pollution prevention provisions: (1) inspections (to verify compliance); and (2) investigations (to gather evidence of a suspected violation).¹³²

The Compliance and Enforcement Policy identifies the following responses to alleged violations:

- warnings;
- directions by Fishery Inspectors;
- orders by the Minister;
- injunctions; and
- prosecutions.¹³³

The policy discusses section 42 of the *Fisheries Act*, which allows for civil suits by the Crown to recover costs incurred to prevent or correct harm from a violation of section 36. It states: “The Crown will attempt to obtain recovery of costs through negotiation with those responsible. In the event that negotiation is unsuccessful, the Crown will initiate or proceed with civil action under the *Fisheries Act*.”¹³⁴ According to both Mr. Steele and Dr. Manon Bombardier, national director, Environmental Enforcement Directorate, Environment Canada, to their knowledge section 42 has never been used.¹³⁵

Mr. Steele and Dr. Bombardier (of DFO and Environment Canada, respectively) agreed the Compliance and Enforcement Policy is an “important policy” that provides “significant guidance” to the two departments and is still valid.¹³⁶

National Habitat Compliance Protocol

The National Habitat Compliance Protocol between the Habitat Management Program and the Conservation and Protection Directorate (Compliance Protocol), discussed in detail in Chapter 6, Habitat management, establishes “lead” and “support” roles for the Habitat Management Program and C&P. C&P leads in several roles:

- integrating habitat compliance priorities into C&P work plans;
- assessing compliance risk factors used in compliance risk assessment;
- gathering information in support of occurrence screening;

- carrying out activities aimed at compelling compliance;
- issuing inspector’s directions, warnings, and ministerial orders;
- conducting investigations, laying charges, preparing court briefs, executing warrants, coordinating with the Department of Justice, providing evidence in court, and supporting the prosecutions process;
- making recommendations to prosecute;
- follow-up monitoring on compliance issues; and
- tracking and maintaining information related to inspections, investigations, and prosecutions in the Departmental Violation System database (see discussion of data and file management below).¹³⁷

The Compliance Protocol is built on the premise that the Habitat Management Program “assumes the lead responsibility for activities and decisions that aim to educate, promote and assist compliance with the habitat protection provisions of the *Fisheries Act*; and C&P assumes the lead responsibility for activities that aim to compel compliance with the *Fisheries Act*.”¹³⁸ Annex 2 of the Compliance Protocol provides a summary of the roles and responsibilities of the Habitat Management Program and C&P with respect to habitat compliance activities.¹³⁹ As discussed below, the Compliance Protocol removes inspectors’ powers from Habitat staff.¹⁴⁰

Environment Canada’s compliance promotion activities

Compliance promotion is described in the Compliance and Enforcement Policy as “the state of conformity’ with the law.”¹⁴¹ Measures to promote compliance include:

- communication and publication of information;
- public education;
- consultation with parties affected by provisions of the *Fisheries Act*; and
- technical assistance.¹⁴²

Within Environment Canada, compliance promotion and enforcement are separated into two

different branches (the Environmental Stewardship Branch and the Enforcement Branch, respectively).¹⁴³ These divisions try to align their activities, especially in newly regulated sectors; “alignment,” according to Dr. Bombardier, means that compliance promotion provides information and education to the regulatee community about its responsibilities, and the Enforcement Branch then monitors where it thinks there may be significant non-compliance.¹⁴⁴

During the hearings, Lisa Walls, former acting manager of Environment Canada’s Pollution Prevention and Assessment Section, Environmental Protection Operations, explained that the department’s compliance promotion focuses on encouraging, promoting, and advising potential polluters to avoid creating or depositing waste. In Ms. Walls’s view, given that section 36 is a general prohibition, compliance promotion is important for avoiding the deposit in the first place rather than prosecuting after the damage has been done.¹⁴⁵ However, from about 2004 to 2006, Environment Canada embarked on a major organizational and structural change, and, according to Ms. Walls, this reorganization led to a reduction in Environment Canada’s capacity for section 36 *Fisheries Act* compliance promotion work.¹⁴⁶

Data and file management

C&P uses a violation-tracking database called the Departmental Violation System (DVS). DVS is used by fishery officers to track occurrences and violations, including information such as the following:

- actions taken (e.g., “investigation initiated” or “no action warranted”),
- the source of information (e.g., was it a call from the general public or DFO staff observation),
- the occurrence type (e.g., “Aboriginal,” “Domestic / Recreational,” or “non-fisher”), violation action taken (e.g., charges laid, warning issued),
- and violation type (e.g., “illegal buy / sell / possess,” “habitat,” or “gear conflict”).¹⁴⁷

C&P also uses an activity-tracking database called the Fisheries Enforcement Activity Tracking System (FEATS) to keep track of the effort of fishery

officers. Each fishery officer inputs his or her data for hours worked and activities performed for each day of work. FEATS enables officers to assign a work element to their hours (e.g., “Aboriginal – Salmon” or “Habitat – Forestry”). It can then be used to generate reports of time spent by officers on various activities in different geographical areas. DFO staff have internally discussed concerns about the accuracy of FEATS data owing to possible inconsistencies in the way fishery officers enter data into the system.¹⁴⁸

Although DFO’s Program Activity Tracking for Habitat (PATH) database is not the primary database for tracking habitat enforcement information (for a description, see Chapter 6, Habitat management), the Compliance Protocol provides that the Habitat Management Program will lead in “tracking and maintaining information related to compliance promotion, compliance monitoring, occurrences, and responses to non-compliance” through the PATH database.¹⁴⁹ However, it further provides that C&P will lead for habitat investigations and prosecutions, which are managed through DVS. When C&P takes over investigation or enforcement related to a file, the transfer is noted in PATH and any further information is then tracked by C&P in DVS.¹⁵⁰ C&P staff may request access to PATH; Habitat staff do not currently have access to DVS.¹⁵¹

Mr. Nelson suggested that if the tracking systems for PATH and DVS were compatible and interactive, this integration would improve fishery officers’ ability to do compliance work on habitat issues.¹⁵²

Similar to C&P’s DVS database, Environment Canada uses a system called the National Emergencies and Enforcement Management Information System and Intelligence Systems (NEMISIS) to “record, monitor and track occurrences, inspection activities, investigation activities and all compliance and enforcement measures undertaken” by enforcement officers.¹⁵³

■ Fisheries enforcement

This section focuses on compliance and enforcement of those legislative provisions relating to fishing, as opposed to fish habitat and aquaculture, which are discussed below.

There are several reasons why enforcement is relevant to the sustainability of the Fraser River sockeye fishery: illegally harvested fish do not reach their spawning grounds, adversely affecting conservation of the stocks; accurate catch numbers for illegally harvested fish are not usually reported to DFO, and this omission may have a negative impact on the accuracy of necessary information for the management of the fisheries; and the illegal sale of fish may, in turn, motivate the illegal harvest of fish, with the results noted above. (For a discussion on monitoring and reporting, see Chapter 5, Sockeye fishery management.)

I heard two days of evidence devoted to fisheries-related enforcement, although the topic arose throughout the hearings. In particular, I heard repeated concern regarding a reduction and anticipated further reduction in the funding of enforcement and the detrimental effect these cuts may have on the fisheries (see discussion below). DFO's ability to enforce compliance in the Fraser River sockeye fisheries has been the subject of criticism in prior reports, as summarized in this Commission's Interim Report¹⁵⁴ and below.

Fisheries enforcement issues in previous reports

Two previous reports were especially critical of DFO's capacity to enforce compliance and made recommendations aimed at addressing this shortcoming: the Honourable John Fraser's *Fraser River Sockeye 1994: Problems and Discrepancies*¹⁵⁵ (Fraser Report), and the Williams Report.¹⁵⁶ For example, Recommendation 13 of the Fraser Report stated:

We recommend that, for the 1995 fishing season, DFO institute a plan to ensure that an effective and credible enforcement level is re-established.¹⁵⁷

The Williams Report contained several recommendations relating to enforcement.¹⁵⁸ In particular, it recommended that DFO properly enforce the *Fisheries Act* and Regulations, through several measures: adequate presence to deter the concealment of over-harvesting of fish

by participants from all sectors; enforcement of the laws against the illegal sale of fish, both fish caught as part of the FSC fishery and fish illegally harvested; and a system to accurately record illegal nets in the Fraser River, through the use of overflights and of night patrols, particularly in areas where illegal fishing has been reported. It also recommended that DFO ensure adequate resources and increase the budget and staffing for enforcement.¹⁵⁹

In response to these reports (and others), DFO increased the resources dedicated to C&P's enforcement activities and changed the reporting structure in C&P. However, according to Mr. Nelson, a recurring cycle of funding shortfalls has led to reviews and reports, resulting in an influx of money, which then is eroded to create another funding shortfall.¹⁶⁰ Before the Williams Report, Mr. Nelson testified, the funding situation was again similar to what he had experienced prior to the Fraser Report, and "there had been a continual erosion, reduction in resources."¹⁶¹ As a result, C&P was unaware of what was happening on the Fraser River during closed fishing times (because of a lack of capacity to conduct patrols) and did not have a credible enforcement presence on Fraser River sockeye fisheries.¹⁶²

Following the Williams Report, there was an annual influx of approximately \$1.8 million of "Williams Money" to bolster C&P in the Pacific Region.¹⁶³ The primary focus for these funds was to address compliance issues with closed-time patrols on the Fraser River.¹⁶⁴ Approximately \$1.2 million of this "Williams Money" was rolled into the Pacific Integrated Commercial Fisheries Initiative (PICFI, discussed below) in 2007.¹⁶⁵ The influx of the "Williams Money" led to a "dramatic increase" in the patrol capability of C&P.¹⁶⁶ Mr. Nelson estimates that the Williams / PICFI funding currently (as of the date of our hearings) accounts for 60 percent of the budgets on the Fraser River for C&P fishery officers.¹⁶⁷

At the time he testified, Mr. Nelson told me that he believes C&P has a credible enforcement presence on the Fraser River. "I am satisfied and staff are satisfied that we have a handle on closed time fishing activity and we're doing - we're doing an adequate job," he testified.¹⁶⁸ However, he is concerned about the accumulation of existing salary shortfalls and the potential for future funding shortfalls.

Non-compliance

Non-compliance of fisheries regulations and licence conditions can take many forms and is not related only to the degree of illegal harvest; it can arise by fishing with improper gear, failing to mark gear, failing to use required selective fishing techniques, failing to carry a designation card, and so on. (For a discussion on selective fishing and commercial and recreational fisheries, see Chapter 5, Sockeye fishery management.) In a presentation to the Integrated Harvest Planning Committee in January 2010, Pacific Region C&P set out its 2009 results for the salmon fisheries, including the rates of compliance by area.¹⁶⁹ Mr. Nelson discussed the information contained in this presentation, noting that he considers the rate of non-compliance in certain 2009 fisheries (29 percent for Aboriginal FSC salmon fisheries on the South Coast area, 20 percent for Aboriginal economic opportunity salmon fisheries in the Lower Fraser River area, and 23 percent for recreational tidal fisheries in the Lower Fraser River area) to be high and requiring attention, as it reflects a lot of illegal activity.¹⁷⁰

In addition to the issue of enforcement where there is general non-compliance, I heard evidence around the following specific non-compliance issues: the mortally wounded clause, dual fishing, and high-seas drift net fishing.

The “mortally wounded” clause

The “mortally wounded” clause is a provision included in some Aboriginal communal fishing licences in the Fraser River and some in the South Coast (it is not found in commercial or recreational fishing licences).¹⁷¹ The mortally wounded clause provides that if a fish is “mortally wounded,” it can be retained, even if the fishery for that species is otherwise closed.

The mortally wounded clause is controversial. I heard from some DFO witnesses that it is difficult to enforce the clause because, in many circumstances, it is difficult to determine whether a fish is in fact “mortally wounded.”¹⁷² Mr. Nelson believes the mortally wounded clause is being abused, and he testified that fishery officers have observed fish being pulled in, with “no attempt to revive anything, no attempt to release anything and the officers have to stand there and realize that they can’t do anything about it.”¹⁷³

Scott Coultish, regional chief of intelligence and investigation services, C&P, supported Mr. Nelson’s testimony, adding that the mortally wounded clause is a “loophole” and that, in some cases, hundreds of fish can be kept for that reason.¹⁷⁴ These are fish that are otherwise protected by a conservation closure, so they may be at the greatest risk. Barry Rosenberger, area director, BC Interior, recounted an incident in 2009 where 6,000–7,000 Fraser River sockeye were kept during a dip net fishery for chinook, under the mortally wounded clause. Mr. Rosenberger agreed that this number was “fairly significant” and it exceeded the number of mortally wounded fish that the department anticipated would occur.¹⁷⁵

However, Ernie Crey, fisheries and policy advisor for the Stó:lō Tribal Council, disagreed with DFO’s evidence about the mortally wounded clause, testifying that the clause is consistent with First Nations perspective (once a fish is caught and is already dead, it should be kept and consumed) and that First Nations are working to determine if a ceiling on mortalities could be implemented.¹⁷⁶

Dual fishing

In this context, dual fishing refers to fishing by First Nations fishers who hold a licence allowing them to conduct both commercial fishing and FSC fishing, which they do concurrently, or fish commercially immediately before or after FSC fishing.¹⁷⁷ According to Mr. Nelson, the problem with dual fishing is that not all the FSC catch is reported to DFO, and it is very difficult to enforce without costly techniques, such as an onboard observer counting fish.¹⁷⁸ However, I also heard of potential benefits associated with dual fishing. Ross Wilson, director of the Heiltsuk Integrated Resource Management Department, told me that it allows Aboriginal commercial fishers who have gone over their quotas to contribute the excess fish to meet FSC needs.¹⁷⁹ Mr. Rosenberger also told me that, in some cases, dual fishing may result in a lower release mortality rate than having separate commercial and FSC fishing times.¹⁸⁰

High-seas drift net fishing

Vessels, often foreign ones, illegally use drift nets on the high seas to catch fish, including salmon. DFO has reported an increase in the numbers of

detected and apprehended high-seas drift net vessels since 2006, suggesting a resurgence of this issue.¹⁸¹ However, according to Mr. Nelson, this increase is the result of a change in the reporting methods applied (all vessels detected were recorded, not just those that were fishing for salmon).¹⁸² Overall, Mr. Nelson testified, the problem of high-seas drift net fishing has decreased significantly.¹⁸³ An expert panel assembled by the Pacific Salmon Commission in 2010 for a workshop on the causes of the Fraser River sockeye decline reached the same conclusion.¹⁸⁴ I note, however, that Canada's contribution to aerial surveillance of the North Pacific Ocean has also decreased: overflight hours by the Aurora aircraft have been significantly reduced, and other countries have also decreased their high-seas enforcement presence.¹⁸⁵

Illegal harvest

According to Mr. Nelson, "illegal harvest" refers to fishing during closed times.¹⁸⁶

The Williams Report made the following recommendation:

Illegal fishing in the Fraser River has been described as rampant and out of control. This is unacceptable. DFO must properly enforce the *Fisheries Act* and *Regulations* and initiate measures to provide a reasonable estimate of the scope of this illegal activity and the number of fish actually taken.¹⁸⁷ [Recommendation 29]

Since then, Mr. Nelson believes, C&P has "done a reasonable job of the illegal fishing activity" on the Fraser River, and, as far as he knows, he "can say with a high degree of certainty that it may be in the hundreds of thousands, but it's certainly not in the millions" of fish that are illegally harvested.¹⁸⁸ However, I note that "hundreds of thousands" of illegally harvested fish are still a large number, particularly in the context of years of low abundance, such as 2009, when only 1.36 million sockeye returned.

There are still many unknowns when it comes to illegal harvest. Mr. Nelson relies on "more of a feel or gut instinct, based on the years of experience" to assess the degree of illegal activity.¹⁸⁹ There

is no structure in place to provide a reasonable estimate of the scope of illegal fishing, and "no way to accurately determine" that amount.¹⁹⁰ Rather, effective enforcement is "very difficult to measure, because you don't know what you're not finding."¹⁹¹

In the marine and coastal areas, a decrease in C&P enforcement capacity and presence has also made it more difficult to accurately assess illegal activity. Mr. Nelson said that C&P's marine capacity for fisheries enforcement has "been reduced over the last number of years, along with increases in other priorities that are coming along."¹⁹² The lost capacity includes a reduction in aerial surveillance flights, reduced access to patrol boats, and the loss of marine enforcement officers (55 marine enforcement officers to none).¹⁹³ Mr. Nelson also told me that a charter patrol program that, at one point, had 37 boats operating as "eyes and ears" on the water with limited enforcement activity, has also been lost.¹⁹⁴ Enforcement capacity has been eroded in marine areas where sockeye pass, and some areas of the coast now get minimal attention.¹⁹⁵ Chief Edwin Newman of the Heiltsuk Nation reiterated this point, testifying that there are very few enforcement officers on the coast.¹⁹⁶

Sales of FSC fish

Illegal sale of food, social, and ceremonial fish is related to the problem of illegal harvest, but it is not necessarily the same thing – FSC fish which have been legally caught (so not illegal harvest) may be illegally sold.¹⁹⁷ Following the Supreme Court of Canada's decision in *R. v. Sparrow*, DFO has provided FSC fishing access to Fraser River sockeye salmon to the majority of Aboriginal groups seeking such access. (For a further discussion of FSC fishing, see the section on Aboriginal fishing policies and programs in Chapter 5, Sockeye fishery management.)

In his testimony, Mr. Coultysh described the problem of illegal sale of fish:

The issue of illegal sale of fish, salmon, from the Fraser River, out of all sectors, but primarily out of the aboriginal food, social and ceremonial fishery, has been an issue, a long-standing issue for the organization and was highlighted in the

Williams Report. The issue ... to consider is that sale is [a] ... root cause of illegal fishing, primarily. It's an economic-based issue, and most of the fish clearly illegally harvested is intended to be sold.¹⁹⁸

In their 1992 report, *Managing Salmon in the Fraser: Report to the Minister of Fisheries and Oceans on the Fraser River Salmon Investigation*, Dr. Peter Pearse and Dr. Peter Larkin wrote, "[W]hile the prevalence of 'illegal sales' cannot be determined (although estimates run as high as 90 per cent in some areas) it is safe to say that most of the salmon caught in the Indian fishery along the lower Fraser in recent years were sold."¹⁹⁹

The Williams Report made the following recommendation:

Throughout the South Coast there is an ongoing problem with the illegal sale of fish, both fish that have been caught as part of an FSC entitlement and fish that have been illegally harvested. We heard little evidence of any serious effort to prevent this activity. This situation is intolerable and must be addressed by DFO.²⁰⁰ [Recommendation 31]

According to Mr. Nelson, the issue of illegal sales noted in the Williams Report is still an issue for the DFO, in all areas within the region, and although efforts have been made to address illegal sales, the problem has not been resolved.²⁰¹ The illegal sale of FSC fish has been a "tremendous problem" for DFO for at least two decades, the level of sophistication has increased, and the techniques used have increased.²⁰² In Mr. Nelson's view, C&P is not currently doing a credible job in the Pacific Region enforcing prohibition of illegal sales of Fraser River sockeye.²⁰³

Illegal sales occur in both the recreational and the Aboriginal FSC fisheries, although Mr. Coultish testified that, in the recreational fishery, the illegal sale of fish is "not significant when it comes to amount and numbers."²⁰⁴ In contrast, Mr. Coultish testified that a "very, very high percentage" of FSC fish is sold (which is illegal)²⁰⁵ – as much as 97 percent or "pretty close" to that figure of Lower Fraser River FSC fish is sold.²⁰⁶ I note that Mr. Coultish was unable to provide the basis for this estimate, although it is similar to the number

cited by Dr. Pearse in 1992.²⁰⁷ I heard from other witnesses who confirmed that FSC fish is sold in their communities (see discussion below).²⁰⁸ However, it does not mean that 97 percent of Aboriginal fishers are selling FSC fish, and Mr. Coultish was adamant that "by far the majority" of Aboriginal fishers comply with the applicable legislation.²⁰⁹ Both Mr. Nelson and Mr. Coultish are concerned that the illegal sale of fish has prevented Aboriginal elders from receiving fish.²¹⁰

Difficulty in proving illegal sales

Illegal sales are very difficult to prove: an illegal sale requires proof of the origin of the fish on a criminal standard (beyond a reasonable doubt), a requirement that is difficult or even physically impossible.²¹¹ Fish may be delivered with the actual sale or transfer of cash performed separately and electronically, making the transaction complex to monitor and requiring the ability to track fish and do forensic audits.²¹² As a result, enforcement against illegal sales takes a lot of resources for C&P.²¹³

Project Ice Storm

Pacific Region C&P witnesses described one investigation into illegal sales of FSC fish which raises questions about the possible impact that this activity is having on the conservation of Fraser River sockeye. Using funding provided following the Williams Report, C&P conducted an assessment (called "Project Ice Storm") of the cold-storage facilities located in the Lower Mainland and Vancouver Island in the fall of 2005.²¹⁴ As a result of this audit, 1.9 million pounds of FSC sockeye were found in cold storage in 110 plants in the Lower Mainland.²¹⁵ (However, because the fish were processed, it is not clear how many sockeye pieces this total represented – the range appeared to be between approximately 345,000 and 470,000 pieces.)²¹⁶ The number of pounds of fish was confirmed following an independent audit.²¹⁷ There was no general commercial sockeye fishery in 2005, and the allocated Fraser River FSC sockeye catch for the Lower Fraser was 90,000 for the Stó:lō, 7,500 for the Tsawwassen First Nation, and 22,500 for the Musqueam First Nation, although the amount of FSC fish harvested greatly exceeded

the allocation: the Stó:lō harvested 322,464 pieces, the Tsawwassen 28,081 pieces, and the Musqueam 61,858 pieces.²¹⁸

C&P believe that the majority of the FSC fish held in the cold-storage plants were sold. According to Mr. Coultish, the fish were kept in a manner “consistent with the type of processing that you would see for commercial fish and how it was handled or packaged”; and because “there are substantial costs attributed to that,” it “leads [C&P] to believe that this product was simply not just for food, social and ceremonial use.”²¹⁹ Mr. Nelson agreed that it is “remotely possible” that the fish were used for FSC, but said, “[I]t’s much more conceivable and likely that this large amount of this fish entered the commercial market.”²²⁰

A C&P assessment of Project Ice Storm asserted that “the FSC First Nations fishery on the Lower Fraser River is largely out of control and should be considered in all contexts a Commercial Fishery.”²²¹ Mr. Coultish agreed, stating that the “overwhelming information in evidence that we’ve had in C&P is that the majority of fish harvested under these communal [FSC] licences is sold.”²²² Mr. Nelson said that he was not “surprised by the results.”²²³ Project Ice Storm did not result in any charges because storage of fish is not illegal and there was no evidence of illegal activity found.²²⁴ No similar audit of cold-storage facilities has been conducted since.²²⁵

Other evidence of sales of FSC fish

Several witnesses testified that FSC fish, including Fraser River sockeye FSC fish, is sold. Chief Kimberley Baird of the Tsawwassen First Nation advised that “prior to the [Tsawwassen] treaty, the prohibition on FSC sales was generally not complied with.”²²⁶ Hereditary Chief Robert Mountain of the Mamalilikula First Nation and Councillor of the Namgis First Nation, testified that he is aware that some people in his territory are involved in FSC sales and he believes that, in years of abundance, a large proportion of FSC fish are sold.²²⁷ Chief Newman of the Heiltsuk First Nation stated that there is a “marginal” amount of FSC fish sold in his community, but only to cover costs of fishers providing for those who are physically or financially unable to fish for themselves.²²⁸ Although not specifically referring to FSC fish, Councillor

June Quipp of the Cheam Indian Band testified that her community lives in poverty and recalled that, as a child, her parents had to catch salmon and “actually sell a lot of it in order to ... provide other food for the family and clothing.”²²⁹ Joseph Becker of the Musqueam First Nation advised that, although a fisher “does not eat fish 365 days a year,” he can “certainly go out and convert some of his food fish to a hamburger or steak.”²³⁰

The sale of food fish, according to Dr. Douglas Harris, of the University of British Columbia Faculty of Law, may be an old problem. He writes that at the turn of the century “the limited food fishery did not, of course, stop Aboriginal fishers from selling or trading fish without a licence.”²³¹ Grand Chief Clarence Pennier of the Stó:lō Tribal Council similarly acknowledges that the prohibition against selling food fish is a “law that has been broken for, what, over 100 years?”²³² He told me that “aboriginal people will continue to sell fish out of necessity as a means to feed and clothe their families,” and that DFO’s prohibition is ineffective.²³³

In contrast, I heard from Mr. Crey that allegations that a large proportion of FSC fish from the Lower Fraser River are sold are “groundless” and “opinion,” noting that the fishers he knows fish for their families and communities.²³⁴ He finds such allegations hurtful and damaging to the relationship that his community has been working to build with DFO.²³⁵

According to Technical Report 7, Fisheries Management, which summarizes the annual catch of FSC and economic opportunity fish from 1992 to 2008, a significantly greater number of FSC fish are caught during years where there are few commercial fishery openings.

Perspectives on sales of FSC fish

Although a few witnesses advised me of their personal beliefs that FSC fish should not be sold,²³⁶ the majority expressed the view that the disposition of FSC fish, including sale, should be left to the harvesting group. In the Lower Fraser River, Councillor Quipp testified that fishers in her community believe that, in years of abundance, there is no reason to limit sales of fish caught by Aboriginal fishers and that the sale of fish should be included in the word “social” of “food, social, and ceremonial” fishing.²³⁷ Grand Chief Pennier noted that the Stó:lō Tribal Council has not taken

a formal position on the issue, but his view is that the prohibition on sale should “be eliminated.”²³⁸ Chief Baird finds the restriction paternalistic.²³⁹ To her, it is “no one’s business” what people do with their own fish, a view shared by Mr. Becker.²⁴⁰ Chief Mountain advises that many Aboriginal people want to sell their FSC fish because “they are aware of other First Nations doing it.”²⁴¹ Hereditary Chief Russ Jones of Skidegate (Haida Nation) and technical director / policy analyst / project manager, Haida Fisheries Program, feels that this is a decision for individual First Nations to resolve and notes examples of First Nations that leave it up to the fisher to decide what they’ll do with their fish.²⁴² Grand Chief Saul Terry from the St’at’imc Nation (in the Upper Fraser River) advised that “a lot of our folks feel that it is wrongful to say that we are doing wrong by selling.”²⁴³ Barry Huber, Aboriginal affairs advisor, BC Interior, DFO, testified that this view is shared in many other Aboriginal communities.²⁴⁴

Mr. Bevan, however, considers the prohibition on sales to be important because, in his view, allowing sales may create demand for additional harvesting and increased demand makes it harder to “keep within the limits and have the rules respected relevant to the total catch.”²⁴⁵ He testified that if DFO were to provide an allocation to First Nations without restrictions on use, this practice would be “a very difficult arrangement to contemplate, given the priority that FSC has over economic opportunities.”²⁴⁶

Habitat enforcement

An “occurrence” is “an observed or reported incident which is a potential violation of a statute or regulation.”²⁴⁷ Enforcement procedures, such as inspections or investigations, are initiated in response to an occurrence. According to Mr. Nelson, all the occurrences listed in Table 1.7.2 could have, and would have, an impact on Fraser River sockeye habitat if they occurred in the Fraser River watershed. He explained that, with respect to rural / urban development occurrences, individually the violations are generally small activities, but taken together they have a “very big cumulative effect.”²⁴⁸ In his view, linear developments have “quite significant impacts on fish.”²⁴⁹

Table 1.7.2 includes fish habitat occurrences entered by C&P field staff in the Pacific Region for the 2009/10 fiscal year.

In almost 60 percent of occurrences (417), an investigation was initiated. In 83 occurrences, no action was warranted; 102 occurrences were referred to another department or government; in 34, a response was pending at the end of the fiscal year; and in 62, C&P was unable to respond.²⁵⁰

Between 2000 and 2010, the habitat occurrences responded to by C&P in the Pacific Region declined.²⁵¹ Regarding subsection 36(3) occurrences, I heard from Dr. Bombardier that, nationally, agriculture (e.g., cows in streams, pesticides) is an issue for non-point source pollution.²⁵²

Table 1.7.2 Fish habitat occurrences entered by C&P field staff in the Pacific Region, 2009/10

Count of Field Office		
Region	Fishery	Total
Pacific/Pacifique	HABITAT - AGRICULTURE	46
	HABITAT - AQUACULTURE	16
	HABITAT - FORESTRY	28
	HABITAT - HYDRO	17
	HABITAT - INDUSTRIAL/COMMERCIAL	106
	HABITAT - MINING	27
	HABITAT - OIL/GAS	24
	HABITAT - RECREATIONAL	84
	HABITAT - RURAL/URBAN DEV.	286
	HABITAT - TRANSPORTATION	64
PACIFIC / PACIFIQUE Total		698
Grand Total		698

Source: Policy and Practice Report 9, Habitat Enforcement, pp. 30–31.

Other types of occurrences include aquaculture, industrial / commercial (contaminants in the marine environment), industries not regulated by *Fisheries Act* regulations, and recreational activities.²⁵³

Habitat enforcement options

Section 35

According to Mr. Nelson, the number of habitat cases that go to prosecution in the Pacific Region is not great.²⁵⁴ Mr. Steele indicated that the number is likely less than 10 per year, although he did not specify whether that estimate was for the Pacific Region or C&P nationally.²⁵⁵ However, he testified that prosecution is the far end of the continuum in terms of actions available to C&P, and other enforcement options are less costly and less time-consuming.²⁵⁶ He described how C&P has a three-tier (or three-pillar) approach to achieving compliance:

So what we came up with at the end of the day was sort of a three-tiered approach to doing that, Tier 2 being sort of the traditional methods that we use for enforcement activities on the fisheries side as well as habitat enforcement, regular patrols, that kind of thing including warnings and prosecutions and all of what that entails.

The Tier 1 type activities which we had been somewhat involved in up until then, and that refers to things as we spoke about earlier, public relations activities, stewardship, working with communities and user groups on a more proactive type basis, trying to prevent problems down the road, educate and stewardship activities, that kind of thing. All of that came under what we term Pillar 1 and, as Mr. Nelson referred to earlier, he said that in Pacific Region, I think, there's a general target of ten percent of fishery officer time is sort of the overall objective in terms of activities related to Pillar 1, and that's a national approach that we've taken with the program across the country.

I'm not sure that we're exactly at ten percent everywhere, but there's been a definite increase, I'd say, over the last five to six years in terms of

effort devoted towards those general Pillar 1 type activities to promote and achieve compliance in ways other than laying charges and bringing cases to court.

Pillar 3, not related so much to the habitat files, but more on the fisheries enforcement end of things, Pillar 3 refers to major case investigations, intelligence gathering. The intelligence gathering, I guess, could have some application to the habitat world, but more strictly applied in the fisheries enforcement realm.

So we've made an effort to shift our focus into those two new pillars of activity, 1 and 3, and away from the more traditional approaches to enforcement.²⁵⁷

Further, Patrice LeBlanc, director of the Habitat Management Policy Branch, DFO, said there are different ways to enforce the law other than just bringing people to court. According to him, compliance is a balance among several factors: education, advice and assistance, and compelling proponents to take action in cases of non-compliance.²⁵⁸

Fines are an enforcement option for violations of the *Fisheries Act*, although Mr. Nelson said more than \$1 million in fines are outstanding in the Pacific Region.²⁵⁹ C&P does not have a system to collect and follow up on these.²⁶⁰ Neither he nor Mr. Steele was sure of the reason, but Mr. Steele thought that C&P may have received legal advice to the effect that fishery officers do not have the appropriate authority to execute warrants of committal that would be required to follow through on collection of outstanding fines.²⁶¹ Mr. Steele indicated that not collecting fines has the potential to negatively affect compliance and deterrence.²⁶²

Section 36

Environment Canada has access to the same enforcement options for section 36 that C&P has for section 35 violations.²⁶³ In Dr. Bombardier's view, although public focus is often on prosecutions, this option is only one tool in the enforcement toolbox. The Compliance and Enforcement Policy sets out an escalating approach where prosecution is the strictest measure.²⁶⁴ As Dr. Bombardier explained,

Under the Compliance and Enforcement Policy for *Fisheries Act*, the approach is more of

an escalating approach, so depending on their circumstances, warning letters could be issued that may have significant deterrence effect depending on the circumstances. Inspectors' directions is another tool that our fisheries inspectors use and those have been quite effective in achieving deterrence and achieving good environmental outcomes because it does sometimes involve significant investment from the regulatee to take action to prevent or stop a release. So inspectors' direction[s] are very effective. Ministerial orders as well, although we haven't used them too much.

So prosecution is the most strict measure, and we try to use other tools before we go there 'cause it's a lengthy trial, it's also fairly costly. The Compliance and Enforcement Policy has specific circumstances where prosecution will be used, if it's a deliberate release, if there's obstruction. So those are the types of circumstances that will lead to prosecution, but it's not always the best or most effective tool to achieve compliance.²⁶⁵

Environment Canada has an internal decision-making process which sets out the types of decisions that might need to be made in relation to a particular enforcement activity, occurrence, or violation, and identifies who has the authority to make that decision.²⁶⁶

Under CEPA, but not the *Fisheries Act*, Environment Canada has another enforcement tool called "Environmental Protection Alternative Measures." This agreement between the prosecution and the defence avoids court time and imposes conditions on the regulatee to correct and/or mitigate the violation.²⁶⁷ Mr. Steele indicated that it has the potential to be a useful enforcement tool for C&P.²⁶⁸

Ticketing

Currently, under the *Fisheries Act*, neither C&P nor Environment Canada can issue a ticket for a violation. However, all the habitat enforcement witnesses thought this idea has potential and should be explored.²⁶⁹ All also agreed that ticketing would require a legislative change to the *Fisheries Act*.²⁷⁰ Dr. Bombardier indicated that ticketing would require new offences under the federal *Contraventions*

Act and an agreement with the provinces because, although federal officers would issue the tickets, provincial courts would have to administer them.²⁷¹

Quality assurance and control

In 2009, the Commissioner of the Environment and Sustainable Development (CESD) criticized C&P's approach to documenting its enforcement decisions under the Compliance and Enforcement Policy. (For a description of the Compliance and Enforcement Policy, see the enforcement policies and practices section of this chapter.) In its report, the CESD found an overall lack of documentation in the fish habitat occurrence files. Information such as the assessment of violations and the factors to be considered to achieve the desired result from the alleged violator were missing from some audited files, along with information documenting follow-up monitoring to ensure that the requested corrective action was carried out.²⁷² The CESD recommended that

Fisheries and Oceans Canada should ensure that its enforcement quality assurance and control processes are sufficient to demonstrate that its actions have been taken in accordance with the Compliance and Enforcement Policy. The Department should provide guidance on the type of complaints that fishery officers should respond to and take action on, and the Department should specify minimum documentation requirements for occurrences.²⁷³

In its October 28, 2010, internal response to the 2009 CESD report, DFO noted the following action items: (1) "operational protocol to ensure consistency with the Compliance and Enforcement Policy completed"; and (2) "Operational protocol provides guidance o [sic] the type of complaints that Fishery Officers should respond to and take action on."²⁷⁴ Mr. Steele stated that the development of the Compliance Protocol is "basically the response to those two action items."²⁷⁵

Similarly, the 2009 CESD report found that Environment Canada had no overall process by which headquarters reviews regional enforcement activities to assess whether the Compliance and Enforcement Policy is followed and consistently

enforced, and the department has limited information on the nature and extent of *Fisheries Act* compliance issues.²⁷⁶ To remedy this situation, the CESD recommended that

Environment Canada should ensure that its enforcement quality assurance and control practices are sufficient to demonstrate that its actions have been taken in accordance with the Compliance and Enforcement Policy.²⁷⁷

In response, Environment Canada created a position in its national headquarters for a person to look at enforcement action files in its NEMISIS database and identify inconsistencies. In addition, national guidelines have now been prepared for officers entering data into the NEMISIS database.²⁷⁸

Responsibility for section 36

As described, at the time of the hearings the administrative responsibility for section 36 of the *Fisheries Act* has been delegated to Environment Canada. However, the division of labour between Environment Canada and DFO is not always clear. Indeed, in the past decade, “more than half of the convictions under section 36 have been the result of prosecutions by DFO.”²⁷⁹ As noted above, Bill C-38 enables cabinet to designate by order any federal minister as the minister responsible for the administration and enforcement of subsections 36(3) through (6). (For a discussion of DFO and Environment Canada’s section 36 responsibilities relating to contaminant research and monitoring [as opposed to enforcement], see also the section on contaminants in Chapter 6, Habitat management.)

Senior management witnesses from Environment Canada and DFO told me that many of the specific requirements of the 1985 MOU on section 36 are not being met, but that work is under way to renew the MOU, and, at the regional level, it is being well implemented.²⁸⁰ With respect to the two regional working agreements on the division of section 36, Dr. Bombardier’s understanding is that these agreements are working very well at the regional level.²⁸¹ On the other hand, Mr. Nelson testified that he does not use the Interim Operational Working

Arrangement on Enforcement of Section 36(3) very often in his work, and Dr. Bombardier admitted that annual reviews under either this document or the 1987 Regional Working Agreement on Section 36 have not been carried out.²⁸²

DFO’s C&P program identified a review of the 1985 MOU as a national priority for 2010–11, following on the heels of the 2009 CESD report’s recommendation that DFO and Environment Canada should clearly establish the expectations for Environment Canada’s administration of the pollution prevention provisions of the Act.²⁸³

DFO has also noted limitations on Environment Canada’s powers in respect of enforcing the pollution prevention provisions of the *Fisheries Act*. For example, although the 1985 MOU and the 1987 RWA empower Environment Canada to administer and enforce section 36, these documents did not provide for accountability, auditing, or joint planning, nor do they allow Environment Canada to make ministers’ orders, call for plans, exercise other discretionary powers, or enact regulations – those powers remain with DFO or the Governor in Council.²⁸⁴ Subsequently, in 2006 the two departments signed a regional Interim Operational Working Arrangement to clarify their roles and responsibilities.²⁸⁵ However, in 2009, the CESD reported that Environment Canada had not yet clearly identified what it has to do to fulfill its responsibilities in respect of section 36, nor did it have a systematic approach to addressing risks of non-compliance with that provision.²⁸⁶

According to Mr. Steele, the arrangement with respect to section 36 and Environment Canada

works reasonably well the closer you are to the field level. From my experience and from what I hear from our own field staff, I think generally the working arrangements are quite good and clear arrangements are in place in terms of an understanding of roles and responsibilities, good interaction at the field level between our officers and DOE [Environment Canada] officers ... from my perspective, as you move higher up probably in both – or at least on the DFO side ... I think there’s probably more room for improvement as you move higher up in the organization, speaking at the Ottawa level. There are, I think, some shortcomings in terms of lack of regular contact and communication at the higher

level, my own level, and even director level, for example, at – in Ottawa. A lot of reasons for that, but I think it's pretty apparent that there is room for improvement in that respect.

And the other comment I would make generally ... [is] that there does tend to be some confusion, I would say, on the part of probably the public, but also within government, certainly within our organization. I've heard accounts of that from field staff and others, some confusion as to who should handle particular files, respective roles and responsibilities. Both organizations, I would say, are faced with workload and resource issues, so sometimes I think there may be a tendency to rely on the other party to take responsibility for certain files.²⁸⁷

Mr. Nelson and Dr. Bombardier both agreed with Mr. Steele's assessment about how the arrangement is working at the field level.²⁸⁸

Mr. Nelson stated that, in the eyes of the public, it can be confusing because of the involvement of DFO, Environment Canada, and the province, as well as links to the Coast Guard and Transport Canada at times.²⁸⁹ Also, because Environment Canada is much more centralized than DFO, Environment Canada sometimes calls C&P to be the first responder to a situation and then will take the case over if appropriate.²⁹⁰ Environment Canada is limited in its ability to respond in remote areas, so it has to rely on its "partners." This situation may be one reason why there is sometimes an impression by the public that Environment Canada is "passing the buck" to DFO on enforcement matters.²⁹¹

At the national level, Dr. Bombardier agreed with Mr. Steele that there is room for improvement in terms of communication, sharing of information, and joint planning of *Fisheries Act* activities.²⁹² All three habitat enforcement witnesses indicated that, at the higher level, management positions in both DFO and Environment Canada are beginning to re-establish the working relationship that once existed.²⁹³

As of October 28, 2010, DFO and Environment Canada's internal response to the 2009 CESD report's recommendation on establishing expectations for Environment Canada's administration of section 36 was that "Fisheries and Oceans Canada and Environment Canada are reviewing the

administration of section 36 and expect to have a renewed MOU by March 2012."²⁹⁴

I heard from Ms. Dansereau that significant progress has been made to clarify the roles of DFO and Environment Canada with respect to the administration of section 36. According to Ms. Dansereau, DFO is working with Environment Canada at "many levels" to update the 1985 MOU.²⁹⁵

Mr. Nelson testified that the working relationship between DFO and Environment Canada on section 36 matters could be improved by continuing recent discussions initiated at the management level and by getting officers from both departments together, perhaps every two years, to talk at the field level. He also said that a renewal of the Interim Operational Working Arrangement on Enforcement of Section 36(3), setting out the working relationship, could be helpful, but that it is not as important as bringing staff together.²⁹⁶ Mr. Steele indicated that, to improve the working relationship between departments, bringing management together at the national level may be even more important than bringing together field staff.²⁹⁷ However, both he and Dr. Bombardier explained that turnover in staff within both Environment Canada and DFO makes it difficult to realize this goal.²⁹⁸

Finally, the witnesses provided other suggestions for improvements in the DFO–Environment Canada relationship, among them:

- improve communication with the public and Environment Canada's partners;
- decentralize some of Environment Canada's staff and house them in joint offices with DFO fishery officers;
- integrate the agreements into enforcement training, a practice that could be done jointly with DFO; and
- carry out post-mortems of enforcement cases with DFO and Environment Canada.²⁹⁹

Should administration of section 36 remain with Environment Canada?

I heard evidence regarding Environment Canada's administrative responsibility for section 36 even though, at the time of the hearings, legislative responsibility remained with DFO. Witnesses were asked whether this arrangement is optimal for protecting Fraser River sockeye salmon.

Mr. Steele's view is that many arguments favour having responsibility for section 36 rest with either DFO or Environment Canada. But he also said that a close working relationship between DFO and Environment Canada would still be necessary because of resource and capacity levels in both organizations. Mr. Steele said that if one department did take over all responsibility for section 36, there would have to be a shifting of resources between the two agencies, which is "never something that's easy to accomplish and usually runs into lots of debates and discussion, usually leads nowhere from my experience."³⁰⁰

Mr. Nelson stated that any kind of arrangement can work if it is properly resourced. He pointed out that, from the public's point of view, it would probably be easier if one department had sole responsibility and that this shift warrants consideration although it would be a difficult change to implement.³⁰¹

Dr. Bombardier did not give a direct answer to this question, but she appeared to favour the status quo.³⁰² She noted that, even if Environment Canada were no longer responsible for subsection 36(3), its expertise in chemical-based pollutants and spills would still be required because of its other responsibilities under CEPA.³⁰³

Otto Langer, former DFO manager in habitat and water quality positions as well as former Environment Canada manager of the Environmental Protection Service Freshwater Studies and Contaminants Control Program, addressed the question of whether it would change the amount of resourcing involved in habitat enforcement to have responsibility for section 36 moved to DFO from Environment Canada.³⁰⁴ He testified that if section 36 were to revert back to DFO, then strong direction, leadership, and support from DFO senior management would be required. In his view, the cost of moving responsibility for section 36 back to DFO would not be costly because in the Pacific Region, DFO and Environment Canada share office space, services would not change, and some consolidation could occur and savings result.³⁰⁵ He also said there would be efficiencies in combining Environment Canada's and DFO's laboratory services.³⁰⁶ However, he noted that these efficiencies may not apply in national headquarters or other regions of Canada.³⁰⁷ I note that Mr. Langer has no direct knowledge of staffing levels for section 36-related work after 2001.³⁰⁸

Enforcement priorities

C&P and Environment Canada have different priorities for enforcement activities. This is to be expected, given their overlapping yet distinct administrative mandates for sections 35 and 36 of the *Fisheries Act*.

Conservation and Protection Directorate

DFO's national Conservation and Protection Directorate uses a national integrated risk management process. It is a consensus process whereby regional directors from all regions develop a list of priorities for the coming year.³⁰⁹ Each region then uses these national priorities to guide its own integrated risk management processes. For fiscal year 2010/11, habitat compliance was ranked as medium to high priority and higher priority than commercial fishing.³¹⁰ It was also ranked as having low achievability.³¹¹

In 2005, then minister of fisheries and oceans Geoff Regan announced the Environmental Process Modernization Plan (EPMP), which is discussed in detail in Chapter 6, Habitat management. In Mr. Nelson's view, the EPMP and the Williams Report sent a very clear signal in about 2004 or 2005 that fishery officers should not be doing habitat enforcement work; this direction was followed in the Pacific Region, including on the Fraser River.³¹² Mr. Steele testified that the EPMP and the Williams Report sent a message to shift C&P focus from habitat enforcement to fisheries enforcement, and that such a change, in fact, occurred.³¹³

Estimates vary of the time spent by fishery officers in the Pacific Region on habitat issues, but the evidence presented supports the witnesses' views that, about 2004 or 2005, a decrease occurred in habitat enforcement work. One estimate, based on FEATS data for 2009, says that fishery officers in the Pacific Region spent 9.5 percent of their total time on "habitat enforcement"; the remainder on "fisheries enforcement."³¹⁴ Another document, also based on FEATS, shows that, of the total hours logged by fishery officers, 3.61 percent were attributed to "habitat" in 2009. However, I note that almost 60 percent of hours were not attributed to a specific work element.³¹⁵ From 2001 to 2010, the percentage of hours officers in the Pacific Region spent on habitat issues has varied from

a low of 3.61 percent to a high of 10.61 percent (in 2003); the “no work element identified” ranged from 55.47 percent to 64.21 percent of the hours logged.³¹⁶

As part of the Commission’s investigation, Commission counsel requested that C&P look at FEATS and provide information on the number of hours that fishery officers spend on habitat-related activities in comparison to all other activities, and to provide information on the number of patrol hours spent on habitat patrols versus other patrols. Commission counsel asked, to the degree possible, for C&P to provide information for the whole Pacific Region, and for those parts of the region that most closely match up with the Fraser River watershed. The results of this request are found in Appendix B of Policy and Practice Report 9, Habitat Enforcement (March 7, 2011), and were confirmed by Mr. Nelson in his oral testimony.³¹⁷ They suggest that, on average for the past 12 years, 16.65 percent of all fishery officer hours and 12.2 percent of patrol hours were spent on habitat work. Time spent on habitat appears to have dropped – from 22.88 percent in 2004 to 13.81 percent in 2005, and lower since then.³¹⁸ Mr. Nelson described this decrease in terms of fishery officer patrol time: in 2003, habitat-related patrol time was 24 percent, which is equivalent to about 36 fishery officers; in 2010, it was 10 percent, which is equivalent to about 12 fishery officers.³¹⁹ The decreasing trend in habitat-related patrol time coincides with the EPMP.

Mr. Nelson does not view the effect of the change in direction away from habitat enforcement as something positive. As he put it:

But in my view, removing, reducing the amount of fishery officers out doing any enforcement work, but including habitat enforcement, reduces our effectiveness. Officer presence is one of the best deterrents we have. The presence of a uniformed fishery officer in any fishery and in habitat cases, really it’s the best tool we have.³²⁰

Environment Canada

The Environmental Enforcement Directorate has a template work plan that identifies its mission and immediate and long-term outcomes.³²¹ The work plan also identifies target sectors where

Environment Canada believes there is the highest risk of non-compliance. Environment Canada also conducts an annual exercise on integrated compliance promotion and enforcement effort priority-setting. This process identifies key priorities for the coming year as guides for developing regional work plans, which are then integrated into a National Enforcement and National Compliance Promotion work plan.³²²

Removal of inspector powers from habitat staff

As mentioned above, Habitat Management Program staff are no longer designated as inspectors. Instead, they are designated as fishery guardians, with limited powers, while C&P fishery officers are designated as inspectors. This change means that Habitat Management Program staff can no longer write up an inspector’s direction for a stop-work order if a violation is occurring. Rather, they must call on a fishery officer to do so.³²³

Mr. Nelson testified that, in some cases, a fishery officer may be hours away or may not be reached, and, in the meantime, the potential violation could continue.³²⁴ If the human resources are there, it is not impractical to have fishery officers rather than Habitat staff issue directions. However, Mr. Nelson feels that the result is that C&P staff end up doing more of the habitat compliance work that Habitat staff are supposed to be taking on under the EPMP.³²⁵

According to Mr. Steele and Mr. LeBlanc, the removal of inspector powers from Habitat staff was made in response to health and safety concerns raised by Habitat Management Program staff in other regions of the country.³²⁶ Mr. LeBlanc stated that this decision was made in Ottawa for a “number of reasons, including safety and the fact that Fisheries officers are specially trained for enforcement purpose and totally dedicated to that function.”³²⁷ However, Mr. Nelson testified that the safety concern arose from a single incident which was an “over-reaction”; and if this was in fact the reason for the change, the change in status does not eliminate the concern since Habitat staff are still on site with fishery guardian status.³²⁸

Rebecca Reid, former regional director, Oceans, Habitat and Enhancement Branch, and current regional director, Fisheries and Aquaculture

Management, commented that, from the Pacific Region's perspective, a gain in efficiency resulted when Habitat staff assumed inspector powers.³²⁹

Dave Carter, regional team leader, Habitat Monitoring Unit, testified that taking inspector status from Habitat staff has the potential to create challenges because, if you have inspector status, you can issue an inspector's direction under section 38 of the Act to avoid the deposition of a deleterious substance. If C&P officers are the only ones empowered to issue these directions, it becomes more challenging to use this power as a preventive measure.³³⁰

The removal of inspector status from Habitat staff stands in contrast to Aquaculture Environmental Operations staff (biologists and veterinarians), who are (or are in the process of being) designated as fishery inspectors (see Chapter 8, Salmon farm management).³³¹

■ Aquaculture enforcement

Responsibility for enforcement activities in relation to fish farms is shared between C&P and DFO's Aquaculture Management Directorate. According to Brian Atagi, area chief for Aquaculture, C&P, Pacific Region, aquaculture occurrences come to C&P's attention through DFO's "observe, record and report" line, through information from partnering agencies or other partners within the department, through C&P inspections, and through intelligence gathering.³³² One or two officers are being identified to take on the role of "area intel officer[s]," but this responsibility will be supplementary to their field operation roles.³³³

The Aquaculture Management Directorate and C&P have developed a draft (as of the time of the aquaculture hearings in August and September 2011) 2011–2013 British Columbia Aquaculture Compliance Protocol.³³⁴ According to this document, where audits, inspections, or monitoring reveals instances of non-compliance, or where public reports generate occurrences, C&P and the Aquaculture Management Directorate collaborate on determining the appropriate response as follows:

- [Aquaculture Management Directorate] shall lead in conducting activities aimed at voluntary restoration.
- C&P shall lead in conducting activities that

aim to compel compliance and the issuance of Inspector's directions, warning and Ministerial orders.

- [Aquaculture Management Directorate] shall support C&P in the development of the contents of Inspector's directions, warning and Ministerial orders.
- C&P, in collaboration with [Aquaculture Management Directorate], shall lead in conducting investigations of aquaculture cases, laying of charges, preparing court briefs, executing warrants, coordinating with the Department of Justice, providing evidence in court and supporting prosecution process.³³⁵

When enforcement issues arise, C&P will issue "non-compliance letters" as soon as possible for the "greatest issues of concern" and will revisit the sites where those are occurring. Sites with "minor issues" would still get a non-compliance letter, but at a later date.³³⁶ Andrew Thomson, director of Aquaculture Management, DFO, emphasized that a "continuum of compliance activities" is presented to salmon farm operators. He said that this continuum begins with informing a salmon farm of its non-compliance through a letter and can continue through to "restorative justice or going to a full prosecution and a fine being assessed by the court."³³⁷ However, both Mr. Thomson and Mr. Atagi said that, as of the date they testified (September 1, 2011), there had been no convictions against salmon farms in the past 10 years (or ever), although charges have been laid.³³⁸ The fine structure for aquaculture offences is the same for all *Fisheries Act* violations, with a maximum fine of \$500,000.³³⁹

Mr. Atagi expressed concern that the option of issuing tickets (rather than bringing a quasi-criminal prosecution in court) is not available under the *Fisheries Act* for aquaculture-related violations, and that DFO places much reliance on self-reported data – making data-gathering for prosecutions potentially difficult:

One of the big issues with aquaculture versus a normal harvest fishery is that everything at the current time is by conditions of licence, so we have no ticketable offences in which to rely upon for minor offences. If we were to go further with enforcement action, we would have

to prepare for prosecution. There is no – we are heavily dependent on self-reporting from the industry and there is – in some other fisheries we have independent mechanism such as dockside monitoring, at-sea observers, electronic monitoring to independently provide the department with information, as well.³⁴⁰

C&P has assessed its needs with respect to delivering a compliance and enforcement program for aquaculture. The program contemplated includes responsibility for salmon farms as well as shellfish and freshwater aquaculture. Mr. Atagi testified that, in his view, a sufficient number of staff to do that job would be 32 full-time-equivalent workers (FTEs).³⁴¹ The latest in a series of draft submissions from C&P to the Aquaculture Management Directorate nationally on its program needs in relation to aquaculture recommended a complement of 18 FTEs: a 13-member dedicated field unit, and a five-member regional support unit.³⁴² C&P ultimately received funding for an aquaculture program made up of 12 permanent FTEs. At the time of the hearings, there was also one more fishery officer temporarily assigned to aquaculture work. Mr. Atagi testified that, in his opinion, the staffing complement he currently has is adequate for “a marine finfish inspection program”; however, if the aquaculture officers have to enter into any sort of significant investigation, it would take staff away from the inspection program. He said the staffing level for the program is not sufficient to meet the needs of a full aquaculture program that includes shellfish and freshwater facilities.³⁴³

Kerra Hoyseth, senior aquaculture biologist, Aquaculture Environmental Operations, DFO, said it is a “huge benefit to have dedicated fisheries officers who are working specifically on aquaculture” – that this arrangement makes for a great partnership and allows officers to share information with biologists.³⁴⁴

Compliance at salmon farms

In addition to enforcement activities, responsibility for compliance in relation to fish farms is also shared between C&P and DFO’s Aquaculture Management Directorate. DFO is implementing a system of industry self-reporting coupled with

government audits. I review in more detail the evidence related to compliance activities at salmon farms, and describe monitoring, reporting, and auditing under the federal conditions of licence, in Chapter 8, Salmon farm management.

Section 36 and fish pathogen and pest treatment at salmon farms

As noted above, section 36 of the *Fisheries Act* prohibits the deposit of deleterious substances in waters frequented by fish. DFO has considered developing a “fish pathogen and pest treatment regulation” to address the topic of drugs and pesticides used at fish farms being deposited into waters frequented by fish.³⁴⁵ Regulation of products for treating captive salmon for diseases or pests (such as sea lice) is complicated by the involvement of different agencies, such as DFO, Health Canada’s Veterinary Drug Directorate, Health Canada’s Pest Management Regulatory Agency, and the Canadian Food Inspection Agency. To date, no such regulation has been developed, though a letter signed by Deputy Minister Claire Dansereau in November 2011 indicates that “DFO will continue to work with the [Canadian Food Inspection Agency] to include appropriate authorities in the proposed [Fish Pathogen and Pest Treatment Regulation].”³⁴⁶

Catherine Stewart, salmon farming campaign manager for the Living Oceans Society and a representative of the Coastal Alliance for Aquaculture Reform, said there is a “black hole around deleterious substances and the pest and pathogen regulation” such that the industry is in effect “exempt from section 36 of the *Fisheries Act* by the absence of requirements under the PARs [*Pacific Aquaculture Regulations*].”³⁴⁷

Trevor Swerdfager, former director general of Aquaculture Management, DFO national headquarters, testified that DFO has considered developing a regulation in relation to the application of pesticides, primarily in Eastern Canada. He said that, initially, DFO thought such a regulation would extend to in-feed treatments such as SLICE (the brand name of emamectin benzoate, a drug used to treat farmed salmon for sea lice). However, he added, DFO no longer holds that view.³⁴⁸ Further, Mr. Swerdfager said that the

idea behind creating a regulation was to remove the outcome of a pesticide application approval potentially being allowed by Health Canada under the *Pest Products Control Act*, but then blocked by Environment Canada, administering section 36 of the *Fisheries Act*. He said DFO has been “experiencing quite a bit of difficulty in terms of figuring out an appropriate legal structure for dealing with this issue.”³⁴⁹ Ms. Dansereau suggested that Environment Canada may be the better ministry to deal with such issues, and that this arrangement could serve to reduce conflict in DFO’s roles.³⁵⁰

Although the creation of a regulation under section 36 of the *Fisheries Act* to deal with pathogen and pest treatments may be a significant issue for those interested in salmon farm regulation, the likely impact on Fraser River sockeye is minimal. As discussed further in Volume 2 of this Report, the authors of Technical Report 5C, Noakes Salmon Farms Investigation, and Technical Report 5D, Dill Salmon Farms Investigation, both agreed that chemical inputs were unlikely to have any significant impact on Fraser River sockeye. Dr. Donald Noakes said drugs and pesticides were unlikely to have any population-level effects on sockeye.³⁵¹ Dr. Lawrence Dill said chemical inputs (including SLICE) were very unlikely to have anything but a local effect.³⁵² However, I view this evidence as another example of how the division of responsibilities between DFO and Environment Canada regarding section 36 is not always clear and may result in gaps with respect to the protection of Fraser River sockeye habitat.

■ C&P budget and funding issues

I heard that C&P currently has a salary shortfall problem and is likely facing further budget reductions and uncertainty from the 2010–2011 departmental strategic review.³⁵³ As described in a 2010 letter to C&P regional directors from Mr. Steele:

Two other factors that made the identification of priorities more important than ever are the current C&P salary shortfall problem and the ever increasing likelihood that further budget reductions to the program are going to occur

in the foreseeable future. We will have to focus much of our attention in the coming year, on how to reshape our program for the future so that we can continue to offer the most effective compliance and enforcement program possible, while living within our means. The concurrent Strategic Review and program evaluation exercises that we will be undergoing in 2010/11 further reinforce the need for a major focus in this area. Notwithstanding the workload demands, it will be important that we participate directly and cooperate fully with the teams that will be coordinating these two important initiatives in 2010.³⁵⁴

Mr. Nelson told me that DFO’s C&P salary shortfall could reduce its ability to pay for overtime and may eventually lead to a reduction in the number of fishery officers.³⁵⁵ Mr. Nelson testified that, for the current fiscal year (2011/12), this salary shortfall was approximately \$500,000–\$600,000 and that the department’s plan to account for it was to not fill current vacancies for five fishery officer positions.³⁵⁶ Mr. Nelson also told me that C&P is now seeing some “serious challenges” in its shortfalls.³⁵⁷

Mr. Steele said that C&P has been dealing with the salary shortfall for the past three to four years by accessing funds from some of C&P’s national programs and providing additional salary money to the regions so that, until now, the impacts on C&P’s ability to do enforcement work have been minimized. However, he was clear that, going forward, the availability of this national funding will become more limited every year, and that the amount of funding to the regions is significantly less than in previous years – so there will likely be impacts this year (2011) and into the future.³⁵⁸ In his view, budget restrictions are impairing the effectiveness of the monitoring and enforcement done by C&P.³⁵⁹

Mr. Steele agreed with Mr. Nelson’s concerns that there would be impacts on enforcement, but he said the anticipated impacts are not clear because they depend in part on the outcome of the department’s strategic review and an internal C&P review currently under way.³⁶⁰

An added worry about funding is the fact that the Pacific Integrated Commercial Fisheries Initiative, which provides some C&P funding, is scheduled

to sunset at the end of the 2011/12 fiscal year.³⁶¹ As discussed above, PICFI funds several C&P enforcement activities. (For a discussion of PICFI, see the monitoring and reporting section of Chapter 5, Sockeye fishery management.) Mr. Nelson expressed concern that when PICFI expires, C&P will be “worse off” (in relative terms) than it was before the 1995 Fraser Report and the 2005 Williams Report.³⁶² If PICFI expires and the funding is not replaced, Mr. Nelson believes, C&P will not have a credible enforcement presence. It will be forced to cut 30–40 fishery officers, or 25 percent of its existing allotment; cut 10–15 fishery officers on the Fraser River; and close 12–13 of its 35 existing offices.³⁶³ According to Mr. Nelson, to stay within the budget as of the fiscal year beginning April 1, 2012, the Pacific Region C&P would need \$4–\$5 million.³⁶⁴

In addition to the expiration of PICFI, a government-wide strategic review initiative may result in additional cuts to C&P funding.³⁶⁵ According to Ms. Dansereau, the 2010–11 strategic review process requires DFO to cut \$56.8 million nationally from its budget.³⁶⁶ With respect to funding for C&P specifically, Ms. Dansereau testified that “how we enforce and how we monitor also ought to change, and so budget levels that might have been required a number of years ago may not be the same budget levels that will be required in the future; they may be more, they may be less.”³⁶⁷ Mr. Bevan added that budgets for C&P require annual re-evaluation and that the introduction of new technologies and enforcement techniques may allow C&P to do its work with a reduced budget.³⁶⁸ Ms. Dansereau agreed and added that DFO is also looking at the policies that are being enforced and how these are being managed.³⁶⁹ However, Mr. Bevan could not point to a specific example where the use of new technologies or enforcement techniques has occurred with respect to enforcement and Fraser River sockeye.³⁷⁰

Findings

Fisheries and fish habitat enforcement for Fraser River sockeye is a multi-faceted issue. Based on the evidence I heard, there are a number of challenges for the Department of Fisheries and Oceans (DFO) and Environment Canada in managing this aspect of the fishery.

Enforcement priorities

In an era of shrinking resources, difficult decisions must be made on how to allocate enforcement funds to achieve the best results. I heard evidence that the purpose of DFO's 2006–7 National Compliance Framework is to provide a solid foundation for the activities the department undertakes to achieve and maintain compliance. It articulates the following three pillars of compliance management:

- *Pillar One (Education and shared stewardship)* focuses on informal and formal education of the public, co-management, and partnerships.
- *Pillar Two (Monitoring, control, and surveillance)* focuses on patrols, inspections, third-party monitoring, inter-agency partnerships, and fishery officer responses to non-compliance.
- *Pillar Three (Major cases and special investigations)* focuses on formal intelligence gathering and analysis, retroactive offence detection and investigation, and the use of specialized skills and technology.

I observe that these three pillars offer an informative categorization of enforcement activities, but do not purport to identify which activities should have relative priority.

DFO witnesses offered different perspectives on how to prioritize enforcement activities and expenditures. David Bevan, associate deputy minister, testified that DFO is focusing its compliance and enforcement efforts on Pillars One and Three, and away from Pillar Two. He said that the department has tried to bring people along to understand the need for conservation and compliance (Pillar One). At the same time, major case investigations (Pillar Three) are required when DFO identifies a systemic problem in a location or in a particular component of fish harvesting and processing. Randy Nelson, regional director of Conservation and Protection, Pacific Region, emphasized the importance of Pillar Two activities, saying that fishery officer field presence is the primary deterrent in enforcement.

I find on the evidence that fishery officer patrols are the primary means DFO has to detect and deter non-compliance – an important function if the department is to meet its conservation mandate. In

their final submissions, counsel for the participants BC Public Service Alliance of Canada and Union of Environmental Workers BC (PSAC / UEWBC) and the Conservation Coalition both highlighted the role that patrols and inspections by fishery officers have on enforcement efforts. I accept the evidence of Mr. Nelson that the presence of fishery officers “is one of the best deterrents [DFO has] ... The presence of a uniformed fishery officer in any fishery and in habitat cases, really it’s the best tool [DFO has].”

Mr. Nelson persuasively argued that there is no substitute for boots on the ground and on the water, and through overflights. I agree. In my view, however, when it comes to prioritizing enforcement expenditures, I do not find it helpful to engage in a debate over the relative merits of the three pillars; all three have value. Rather, the key is having people enforce the rules and ensure compliance to prevent sockeye from being fished illegally. The overarching principle that should dictate the allocation of enforcement resources should be which activities will best support conservation. I accept the evidence of those witnesses who said that conservation is better served by proactively preventing fish from being illegally taken from the water. Preventing the illegal taking of fish will likely involve a combination of community education, community stewardship, and on-the-ground enforcement.

Illegal harvest

On the evidence of Mr. Nelson I accept that, since publication of the Honourable Bryan Williams’s report *2004 Southern Salmon Fishery Post-Season Review* (Williams Report) in 2005, DFO has reduced illegal harvesting (meaning “closed-time fishing”) on the Fraser River.

Sales of FSC fish

I have reviewed the data summarized in Technical Report 7, Fisheries Management, which indicate that, in years where there are no or few commercial fishing opportunities, a larger number of fish are harvested as food, social, and ceremonial (FSC) catch. I have also considered the evidence regarding the investigation known as “Project Ice Storm” as well as the testimony of Chief Baird, Chief Newman, Chief Mountain,

Councillor Quipp, Grand Chief Pennier, Grand Chief Terry, Hereditary Chief Jones, Mr. Crey, Mr. Becker, Mr. Nelson, and Mr. Coultish. I find that, although many people do abide by the FSC sales prohibition, the evidence suggests DFO is not effectively enforcing the prohibition against sales of FSC Fraser River sockeye.

The illegal sale of FSC fish may result in a conservation concern for Fraser River sockeye because this practice could lead to a demand for additional harvesting. Such a demand could encourage under-reporting of FSC catch and/or illegal harvesting. It could also affect the sustainability of the Fraser River sockeye fishery if illegal sales took place in years of low Fraser River sockeye abundance. Those sales could result in some First Nations not getting their FSC fish and would also be unfair to the commercial fishers who may have had their fishing opportunities reduced or eliminated.

The “mortally wounded” clause

The mortally wounded clause provides that if a fish is “mortally wounded,” it can be retained, even if the fishery for that species is otherwise closed. This clause is controversial. Witnesses from DFO’s Conservation and Protection Directorate (C&P) testified that the mortally wounded clause is capable of being abused and is seen as a loophole. However, I also heard testimony that the clause is consistent with the perspective of First Nations, and that First Nations are working to determine if a ceiling on mortalities could be implemented. I accept the evidence of DFO witnesses that the mortally wounded clause is hard to enforce because it is difficult to determine whether a fish is in fact “mortally wounded” in all circumstances.

Habitat enforcement

On the evidence, I conclude that DFO does not have a system to collect and follow up on fines issued pursuant to the *Fisheries Act*. Also, under the current *Fisheries Act*, DFO and Environment Canada cannot issue a ticket for a violation of the Act.

I conclude that fishery officers do not dedicate sufficient time to habitat work and that habitat work has become a lower priority for them. In this respect

I agree with the submissions of the Conservation Coalition and First Nations Coalition that habitat enforcement has not received sufficient emphasis or attention within C&P's priorities, and that more work needs to be done in this area.³⁷¹

The Conservation Coalition recommends that DFO should administer section 36 of the *Fisheries Act*.³⁷² I heard evidence regarding the delegation of administrative responsibility for section 36 to Environment Canada, although at the time of the hearings, DFO was ultimately responsible for ensuring the provision is enforced. Based on this evidence, I conclude that there is a good case for repatriation of section 36 to DFO. Nevertheless, because the focus in the hearings was on the Pacific Region, I am mindful that I am not aware of the national context and implications which may result from repatriation.

Overall, the 2009 report of the Commissioner of the Environment and Sustainable Development recommended that DFO and Environment Canada clearly establish the expectations for Environment Canada's administration of the pollution prevention provisions of the Act. DFO and Environment Canada witnesses testified that, at the field level, delegation of responsibility for enforcement of section 36 appears to be working. On the other hand, Mr. Nelson agreed that, in the eyes of the public, it can be confusing as to who is responsible in certain circumstances – and Dr. Manon Bombardier, national director, Environmental Enforcement Directorate, Environment Canada, and Paul Steele, former director general of C&P, DFO, both said there is room for improvement in terms of communication, sharing of information, and joint planning of *Fisheries Act* activities at the national level. I accept this evidence. I also accept Mr. Nelson's evidence that the working relationship of the departments could be improved.

I conclude that the removal of inspectors' powers from Habitat staff will result in C&P staff doing more of the habitat compliance work that Habitat staff are supposed to be taking on under the Environmental Process Modernization Plan (EPMP) and could result in negative impacts on Fraser River sockeye habitat.

Finally, from the testimony of Mr. Nelson, I conclude that, if the Program Activity Tracking for Habitat (PATH) and Departmental Violation System (DVS) databases were compatible and interactive,

fishery officers' ability to do compliance work on habitat issues would be improved.

Aquaculture enforcement

I find that C&P does not currently have the financial or human resources capacity to undertake major investigations and keep abreast of its inspection duties with respect to salmon farms.

I also find that the current tools and resources available to C&P to enforce the *Pacific Aquaculture Regulations* (PAR) and the *Fisheries Act* against salmon farms are limited. The only option to ensure compliance is to lay charges under the *Fisheries Act*, necessitating an expensive and time-consuming process for what may be a minor offence. However, I make no specific recommendations about this, as there was little evidence about how this situation could best be remedied. Although there was some mention of ticketing, the evidence did not provide me with enough information to determine how this might be implemented and the implications of such a recommendation. I also note that, if DFO chooses to do so, failure to comply with PAR and the *Fisheries Act* could be dealt with through conditions of licence and licence renewal. Also, C&P does not currently have the financial or human resources capacity to undertake major investigations and keep abreast of its inspection duties with respect to salmon farms.

I note that, although Environment Canada is responsible for the administration of section 36 of the *Fisheries Act*, under the federal *Pacific Aquaculture Regulations* Environment Canada is not designated as the agency to which salmon farms must report to regarding their discharges. This arrangement differs from the regulatory oversight of Environment Canada set out in regulations made pursuant to subsection 36(5) of the Act (see, e.g., the *Pulp and Paper Mill Effluent Regulations* and the *Metal Mining Effluent Regulations*).

Funding

The Honourable John Fraser's *Fraser River Sockeye 1994: Problems and Discrepancies* (Fraser Report) and the Williams Report were critical of DFO's capacity to enforce compliance and made

recommendations regarding funding which addressed this shortcoming. In response, DFO increased the resources dedicated to C&P's enforcement activities. However, on the evidence before me, I find that there has been a recurring cycle of funding shortfalls. These shortfalls have then led to problems with enforcement, an increase in illegal harvest, and eventually further inquiries and reviews – ultimately resulting in an influx of money to C&P, which then is eroded to create another funding shortfall.

I accept the evidence of Mr. Nelson that C&P at the time of the hearings had a credible enforcement presence on the Fraser River, but I echo his concern about the accumulation of existing salary shortfalls and the potential for future funding shortfalls.

Following the Williams Report, there was an influx of funding to bolster C&P work in the Pacific Region, primarily to address compliance issues with closed-time patrols on the Fraser River. Some of this funding was rolled into the Pacific Integrated Commercial Fisheries Initiative (PICFI) program. Mr. Nelson's testimony was clear that it is only due to increased funding following the Williams Report that C&P has recently been capable of providing adequate enforcement services in the Fraser River. In my view, there is no substitute for this type of on-the-ground and on-the-water enforcement activity, as well as overflights, and Pacific Region C&P needs to continue to receive

funding that will allow it to provide these services at its post-Williams level.

A number of participants urged me to recommend sufficient funding for enforcement activities. Counsel for the participant B.C. Public Service Alliance of Canada / Union of Environment Workers B.C., which represented the union for many DFO employees, submitted that there was compelling evidence regarding the harm posed by budget cuts to DFO enforcement activities. I agree. It is apparent to me that enforcement is an important area to which DFO needs to continue to devote resources. I accept the evidence of Mr. Steele and Mr. Nelson that C&P currently has a salary shortfall problem and is likely to face further budget reductions and uncertainty from the 2010–2011 departmental strategic review. I also accept the evidence of these witnesses that this problem is impairing the effectiveness of the monitoring and enforcement done by C&P. I am further concerned that PICFI, which provides some C&P funding, is scheduled to sunset at the end of the 2011/12 fiscal year. If this funding is not replaced, then I share Mr. Nelson's concern that, when PICFI expires, C&P will be in relative terms "worse off" than it was before the 1995 Fraser Report and the 2005 Williams Report and will not have a credible enforcement presence.

I discuss these findings and any related recommendations in Volume 3 of this Report.

Notes

- 1 Terms of Reference, a.i.B.
- 2 Public submission, 0236-NCFNSS_350390, p. 3, available at www.cohencommission.ca.
- 3 Public submission, 0256-BRAUER, p. 3, available at www.cohencommission.ca.
- 4 Public submission, 0281-TYLER, p. 1, available at www.cohencommission.ca.
- 5 Public submission, 0031-TYLER, available at www.cohencommission.ca; see also public submission 0281-TYLER, available at www.cohencommission.ca. (Chilliwack Public Forum)
- 6 Public submission, 0682-SWANSTON, available at www.cohencommission.ca; see also public submission, 0216-HENSELWOOD, p. 7, available at www.cohencommission.ca.
- 7 Public submission, 0187-FALL, available at www.cohencommission.ca.
- 8 Public submission, 0190-FETTERLEY, available at www.cohencommission.ca.
- 9 Public submission, 0094-MacLEOD, available at www.cohencommission.ca.
- 10 *Fisheries Act*, RSC 1985, c. F-14, s. 78.
- 11 *Fisheries Act*, RSC 1985, c. F-14, s. 34. I note that Part 3, Division 5, of Bill C-38, *Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, which received royal assent on June 29, 2012, proposes an amendment to the *Fisheries Act*, which would move the definition of "fish habitat" to ss. 2(1).
- 12 *Fisheries Act*, RSC 1985, c. F-14, ss. 25(1) and (2), 33, 33.1(2).
- 13 *Fishery (General) Regulations*, SOR/93-53, ss. 3(1).
- 14 *Pacific Fishery Regulations*, SOR/93-54.
- 15 *Pacific Fishery Regulations*, SOR/93-54, ss. 6-10, 13.
- 16 *British Columbia Sport Fishing Regulations*, 1996, SOR/96-137; see also PPR 7, pp. 5-7.
- 17 *Aboriginal Communal Fishing Licences Regulations*, SOR/93-332; see also PPR 18, pp. 6-8.
- 18 *Foreign Vessel Fishing Regulations*, CRC, c. 815.
- 19 *Foreign Vessel Fishing Regulations*, CRC, c. 815, s. 22.
- 20 *Foreign Vessel Fishing Regulations*, CRC, c. 815, ss. 23-28.
- 21 *Coastal Fisheries Protection Act*, RSC 1985, c. C-33.
- 22 *Coastal Fisheries Protection Act*, RSC 1985, ss. 3-5.
- 23 *Fisheries Act*, RSC 1985, c. F-14, s. 40.
- 24 *Fisheries Act*, RSC 1985, c. F-14, s. 42(3).

- 25 Exhibit 691, p. 3; Rebecca Reid, Transcript, April 4, 2011, p. 80; Randy Nelson, Transcript, April 8, 2011, p. 5.
- 26 Exhibit 689.
- 27 Exhibit 690.
- 28 Exhibit 690, 1.1.
- 29 Exhibit 690, 4.2.
- 30 Exhibit 693, pp. 1, 4.
- 31 Exhibit 690, 4.3.
- 32 Exhibit 691.
- 33 Exhibit 691, pp. 2–4.
- 34 Exhibit 691, p. 3; Rebecca Reid, Transcript, April 4, 2011, p. 80.
- 35 Exhibit 691, p. 3.
- 36 Exhibit 691, p. 4.
- 37 *Pulp and Paper Mill Effluent Regulations*, SOR/92-269.
- 38 *Metal Mining Effluent Regulations*, SOR/2002-222.
- 39 Claire Dansereau, Transcript, September 28, 2011, pp. 36–37.
- 40 Randy Nelson, Transcript, April 7, 2011, p. 25.
- 41 Randy Nelson, Transcript, April 7, 2011, p. 25.
- 42 Manon Bombardier, Transcript, April 7, 2011, p. 25.
- 43 Exhibit 653.
- 44 Transcript, April 7, 2011, p. 34.
- 45 Transcript, April 7, 2011, p. 33.
- 46 Exhibit 692.
- 47 Exhibit 692, 1.4.
- 48 Transcript, April 7, 2011, pp. 34–35.
- 49 Manon Bombardier, Transcript, April 7, 2011, p. 35.
- 50 New section 4.1.
- 51 New section 4.2.
- 52 New section 4.4.
- 53 Paul Steele, Transcript, April 7, 2011, p. 5; Exhibit 686, p. 1; see also PPR 9, pp. 16–17.
- 54 PPR 13, p. 13; see also Exhibit 699, p. 4.
- 55 Exhibit 15, p. 21.
- 56 Paul Steele, Transcript, April 7, 2011, p. 55.
- 57 Exhibit 606.
- 58 Exhibit 605.
- 59 Exhibit 15, p. 15; Paul Macgillivray, Transcript, November 1, 2010, p. 16; Paul Steele, Transcript, April 7, 2011, p. 56.
- 60 Paul Macgillivray, Transcript, November 1, 2010, p. 16.
- 61 Paul Steele, Transcript, April 7, 2011, pp. 55–56; Exhibit 699, p. 4; PPR 9, p. 17.
- 62 Randy Nelson, Transcript, April 7, 2011, p. 55.
- 63 PPR 13, p. 15; see also Randy Nelson, Transcript, April 7, 2011, pp. 12, 55.
- 64 PPR 13, p. 16.
- 65 PPR 13, pp. 15–16; see also Paul Steele, Transcript, April 7, 2011, pp. 55–56; Exhibit 15, p. 30.
- 66 PPR 13, pp. 16–17.
- 67 Exhibit 693; see also Exhibit 657.
- 68 Dave Carter, Transcript, April 6, 2011, p. 43.
- 69 Transcript, April 4, 2011, p. 74.
- 70 PPR 9, p. 16.
- 71 *Fisheries Act*, RSC 1985, c. F-14, ss. 5(4).
- 72 *Fisheries Act*, RSC 1985, c. F-14, ss. 5, 38.
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- 75 *Fisheries Act*, RSC 1985, c. F-14, s. 50.
- 76 *Fisheries Act*, RSC 1985, c. F-14, s. 51.
- 77 *Fisheries Act*, RSC 1985, c. F-14, ss. 38(3.4).
- 78 *Fisheries Act*, RSC 1985, c. F-14, ss. 38(4), (5), and (6).
- 79 *Fishery (General) Regulations*, SOR/93-53, Schedule VIII, Items 1, 5, 7, and 8.
- 80 PPR 13, pp. 19–20.
- 81 Randy Nelson, Transcript, May 17, 2011, pp. 59–60.
- 82 PPR 13, p. 43; Randy Nelson, Transcript, May 17, 2011, pp. 64–65.
- 83 Transcript, April 7, 2011, p. 65.
- 84 Randy Nelson, Transcript, May 17, 2011, pp. 15–16.
- 85 Transcript, May 17, 2011, p. 38.
- 86 PPR 9, pp. 29–30; Randy Nelson, Transcript, April 7, 2011, p. 64.
- 87 Randy Nelson, Transcript, April 7, 2011, p. 43.
- 88 Transcript, April 7, 2011, p. 64.
- 89 PPR 18, pp. 60–64.
- 90 Exhibit 297, p. 6.
- 91 Transcript, July 4, 2011, p. 104.
- 92 PPR 18, p. 62; Randy Nelson, Transcript, April 8, 2011, pp. 81, 83.
- 93 Paul Steele, Transcript, April 8, 2011, pp. 80–81.
- 94 PPR 9, pp. 32.
- 95 Manon Bombardier, Transcript, April 8, 2011, p. 5.
- 96 Manon Bombardier, Transcript, April 7, 2011, p. 56.
- 97 Manon Bombardier, Transcript, April 7, 2011, pp. 56–57.
- 98 Manon Bombardier, Transcript, April 7, 2011, p. 57.
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- 100 PPR 9, p. 33.
- 101 Manon Bombardier, Transcript, April 7, 2011, p. 72; see also Exhibit 697.
- 102 *Canadian Environmental Protection Act*, 1999, SC 1999, c. 33.
- 103 Manon Bombardier, Transcript, April 7, 2011, p. 73.
- 104 Exhibit 650, pp. 3–4.
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- 107 Exhibit 699, p. 2.
- 108 Exhibit 694.
- 109 Exhibit 879; see also Exhibit 878.
- 110 Exhibit 879, p. 2.
- 111 Transcript, April 7, 2011, pp. 46–47.
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- 113 Paul Steele, Transcript, April 7, 2011, p. 46.
- 114 Exhibit 878.
- 115 Exhibit 878; see also Exhibit 879, pp. 5–7.
- 116 Exhibit 878; see also Exhibit 879, p. 7; Randy Nelson, Transcript, May 17, 2011, pp. 59–60.
- 117 Exhibit 879, pp. 2–4; see also PPR 13, pp. 32–34.
- 118 Exhibit 879, pp. 3–4.
- 119 Exhibit 694, p. 5.
- 120 Exhibit 261, p. 8.
- 121 David Bevan, Transcript, September 22, 2011, pp. 6–7.
- 122 Transcript, May 17, 2011, p. 12.
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- 124 Scott Coulitish, Transcript, May 17, 2011, pp. 36–37.
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- 127 Exhibit 693; see also PPR 9, pp. 35–38.
- 128 Exhibit 693, p. 1.
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- 130 Exhibit 693, pp. 5–11.
- 131 Exhibit 693, pp. 12–16.
- 132 Exhibit 693, p. 17.
- 133 Exhibit 693, p. 19.
- 134 Exhibit 693, p. 26.
- 135 Transcript, April 7, 2011, p. 46.
- 136 Transcript, April 7, 2011, p. 44.
- 137 Exhibit 657, pp. 4–6, 9.
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- 140 Randy Nelson, Transcript, April 7, 2011, p. 50.
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- 143 Manon Bombardier, Transcript, April 7, 2011, p. 42; April 8, 2011, p. 21.
- 144 Manon Bombardier, Transcript, April 7, 2011, p. 42; see also Exhibit 711.
- 145 Transcript, June 6, 2011, pp. 78–79.
- 146 Lisa Walls, Transcript, June 7, 2011, pp. 2–3.

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- 150 PPR 8, p. 86.
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- 154 Cohen Commission Interim Report, pp. 111–16, available at www.cohencommission.ca.
- 155 Exhibit 77.
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- 158 Exhibit 606, pp. 40–42.
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- 160 Transcript, May 17, 2011, p. 7; Transcript, April 7, 2011, p. 59; see also PPR 13, pp. 61–62.
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- 162 Randy Nelson, Transcript, May 17, 2011, pp. 6–7.
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- 166 Randy Nelson, Transcript, May 17, 2011, p. 19.
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- 169 Exhibit 882.
- 170 Transcript, May 18, 2011, p. 58; see also Exhibit 882, pp. 9, 17.
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- 175 Transcript, July 4, 2011, pp. 36–37, 40.
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- 177 Barry Rosenberger, July 4, 2011, p. 37; Ken Wilson, July 4, 2011, p. 38; Randy Nelson, Transcript, May 17, 2011, pp. 42–43.
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- 180 Transcript, July 4, 2011, pp. 37–38.
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- 182 Transcript, May 17, 2011, p. 77.
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- 184 Exhibit 73, pp. 9, 60.
- 185 PPR 13, pp. 84–85; see also Randy Nelson, Transcript, May 17, 2011, pp. 44–45.
- 186 Transcript, May 18, 2011, p. 66.
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- 188 Randy Nelson, Transcript, May 17, 2011, p. 10.
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- 190 Randy Nelson, Transcript, May 17, 2011, pp. 11, 12.
- 191 Randy Nelson, Transcript, May 18, 2011, p. 33.
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- 194 Transcript, May 18, 2011, p. 3.
- 195 Randy Nelson, Transcript, May 17, 2011, p. 16.
- 196 Transcript, December 15, 2010, p. 77.
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- 198 Transcript, May 17, 2011, p. 23.
- 199 Exhibit 729, p. 12.
- 200 Exhibit 606, p. 41.
- 201 Transcript, May 17, 2011, p. 22.
- 202 Randy Nelson, Transcript, May 18, 2011, p. 21.
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- 206 Transcript, May 17, 2011, p. 33; see also Exhibit 871, p. 6.
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- 209 Transcript, May 18, 2011, p. 95.
- 210 Transcript, May 17, 2011, p. 34.
- 211 Randy Nelson, Transcript, May 17, 2011, p. 28; Randy Nelson, Transcript, May 18, 2011, p. 26; see also Exhibit 282, p. 4; Exhibit 301, p. 4.
- 212 Scott Coultish, Transcript, May 18, 2011, p. 26.
- 213 Randy Nelson, Transcript, May 17, 2011, p. 28.
- 214 Scott Coultish, Transcript, May 17, 2011, p. 23.
- 215 Exhibit 868, p. 1; Scott Coultish, Transcript, May 17, 2011, pp. 23–24.
- 216 Exhibit 868, p. 1; Scott Coultish, Transcript, May 18, 2011, p. 28.
- 217 Scott Coultish, Transcript, May 17, 2011, pp. 23–24; Exhibit 869.
- 218 Exhibit 718, pp. 38–39; Scott Coultish, Transcript, May 17, 2011, p. 24.
- 219 Transcript, May 17, 2011, p. 25.
- 220 Transcript, May 18, 2011, p. 48.
- 221 Exhibit 870, p. 3.
- 222 Transcript, May 17, 2011, p. 27.
- 223 Transcript, May 17, 2011, p. 27.
- 224 Randy Nelson, Transcript, May 17, 2011, p. 28; see also Scott Coultish, Transcript, May 18, 2011, p. 46.
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- 226 Exhibit 281, p. 3.
- 227 Exhibit 301, p. 4.
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- 229 Transcript, December 13, 2010, p. 42.
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- 232 Transcript, December 13, 2010, p. 81.
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- 235 Transcript, July 5, 2011, p. 79.
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- 253 Manon Bombardier, Transcript, April 7, 2011, p. 38.
- 254 Transcript, April 7, 2011, p. 39.
- 255 Transcript, April 8, 2011, p. 55.
- 256 Transcript, April 7, 2011, p. 40.
- 257 Transcript, April 7, 2011, pp. 41–42.
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- 259 Transcript, April 8, 2011, pp. 67–68.
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 295 Transcript, September 22, 2011, p. 44.
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 369 Transcript, September 22, 2011, pp. 8–9.
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Chapter 8 • Salmon farm management

■ Introduction

This Commission's Terms of Reference direct me to investigate and make independent findings of fact regarding the causes of the decline of Fraser River sockeye, including "aquaculture." As described more fully in this chapter, since December 2010 aquaculture management in British Columbia is a federal responsibility, and the industry is regulated in British Columbia by the Department of Fisheries and Oceans (DFO). To assess whether aquaculture is a cause of the decline and to develop recommendations for improving the future sustainability of the sockeye salmon fishery, it is important for me to set out how salmon farms are regulated and managed, since regulations relate to the risk posed by salmon farms. The focus in this chapter is on whether DFO has (and has had) the policies and practices in place to identify, consider, mitigate, or avoid any risks to Fraser River sockeye posed by salmon farms. It

should be read in conjunction with Chapter 9, Fish health management, and the sections on salmon farms in Volume 2 of this Report.

"Aquaculture" means the cultivation of fish.¹ "Fish" are broadly defined in the *Fisheries Act*, making "aquaculture" also a broad term that encompasses the cultivation of any species of fish and shellfish at any stage of their life cycles.² For salmon, this term would include the cultivation of broodstock, cultivation in freshwater hatcheries, and cultivation in ocean net pens.* Despite the breadth of the term "aquaculture," concerns raised early on in this Inquiry – through public submissions, public forums, and participants' submissions on the Commission's discussion paper of June 2010 – focused on the possible impacts from marine net-pen salmon farms. I have therefore limited the scope of my Inquiry into the effects of salmon farms on Fraser River sockeye. Unless otherwise stated, in this Report the term "aquaculture"

* The scope of the *Pacific Aquaculture Regulations*, SOR/2010-270, does not appear to extend to land-based closed containment facilities, unless fish may escape from such facilities into Canadian fisheries waters (see s. 2).

refers specifically to marine salmon aquaculture or “salmon farms.” For example, I have not investigated the impact of shellfish aquaculture on wild sockeye. Freshwater hatcheries are discussed in Chapter 6, Habitat management.

Another point to make at the outset is that sockeye salmon are not farmed; the current preferred species for salmon farming are Atlantic salmon (the majority of salmon farms) and chinook salmon. I discuss enhancement programs for Fraser River sockeye in Chapter 6, Habitat management.

Salmon farms in British Columbia

Salmon farming began in British Columbia in the early 1970s, with the cultivation of coho salmon. The 1980s saw a rapid increase in the number of farms and a shift to predominantly Atlantic salmon. By 1988, 101 different salmon-farming companies were operating in British Columbia.³ In the 1990s, the industry consolidated such that, by 1997, there were 79 active farms operated by 16 salmon-farming companies. In 2008, 17 companies operated 136 salmon farms in British Columbia’s marine waters. In 2011, at the time of the Commission’s hearings on salmon farms, four main companies engaged in salmon aquaculture on the BC coast, holding 130 tenure licences – not all of which are in active operation at any one time. Those four companies are Mainstream Canada, Marine Harvest Canada, Grieg Seafood BC, and the Creative Salmon Company. Creative Salmon is a Canadian company that raises chinook salmon; the other three companies are Norwegian and raise Atlantic salmon.⁴

The geographical location of salmon farms along the BC coast has changed over the years. Early on, the industry was concentrated on the Sunshine Coast. Later, operators moved to the northeastern and western coasts of Vancouver Island, the Discovery Islands, and the Broughton Archipelago. As of 2010, salmon farms were located around Vancouver Island and the South Central coast (see Figure 1.8.1).



Salmon farm near Quadra Island, BC, 2010

I heard evidence that salmon farms in the Discovery Islands (east of Vancouver Island and north of Campbell River) are located on the migration route of the Fraser River sockeye smolts. I also received submissions from participants concerned about siting farms on this particular section of the sockeye migration route.

Farmed salmon has grown to dominate British Columbia’s provincial salmon harvest. From 2005 to 2009, the landed value* of farmed salmon in British Columbia ranged from about \$320 million to \$410 million annually.⁵ In comparison, over the same period, the landed value of all wild salmon (including sockeye) ranged from about \$20 million to \$60 million annually. In 2010, however, the landed value of sockeye alone was \$91.3 million.⁶

Reports on the number of jobs associated with the BC finfish aquaculture industry vary, depending on whether the jobs counted are direct or indirect, part-time or full-time, or year-round or seasonal. A 2009 PricewaterhouseCoopers LLP report prepared for the province found that salmon farming in British Columbia provides an estimated 6,000 direct and indirect jobs.⁷ In 2010, DFO released a study entitled *Socio-Economic Impact of Aquaculture in Canada*, which reported similar numbers. It indicated that, in 2007, the aquaculture industry generated about 6,000 full-time-equivalent (FTE) jobs in British Columbia, which included 2,220 FTEs in direct activities, 2,330 FTEs in indirect jobs, and 1,410 FTEs in induced activities, totaling \$223.3 million in labour income.[†]

* The “landed value” is the price paid to the commercial fisher or salmon farmer for the whole fish, before processing. In aquaculture, this term can also be referred to as the “farmgate value.” See Exhibit 507, p. 2.

† Exhibit 1366, p. 9. “Direct employment” includes working in hatcheries, farms, processing plants, and administration. “Indirect employment” involves the industries supplying goods and services to aquaculture activities. “Induced activities” arise from spending of income earned by those employed in direct and indirect activities.

A report prepared in 2011 and entered into evidence by the Aboriginal Aquaculture Association states that Aboriginal people represent 14.1 percent of the labour force in the BC aquaculture industry (not including salmon-processing operations) and earn 12.8 percent of the total labour income. With regard to salmon-processing operations in British Columbia (including fish processed from salmon farms), Aboriginal people represent 36.6 percent of the labour force and earn 32.2 percent of total labour income in that sector.⁸

Recent changes in the regulation of salmon farms

Before December 18, 2010, the province licensed BC salmon farms. DFO, which has federal responsibilities for protection of fish habitat (see chapters 3, Legal framework, and 6, Habitat management), reviewed and approved salmon farm applications, issuing authorizations under section 35 of the *Fisheries Act* where it deemed it appropriate to do so.

In February 2009, Mr. Justice Hinkson (then of the BC Supreme Court) determined that salmon aquaculture is a “fishery” under the jurisdiction of the federal government, and, as such, licensing of salmon farms is a federal rather than a provincial responsibility. Justice Hinkson struck down provincial legislation regulating salmon farms, but delayed the effect of his decision until December 2010 in order to give the federal government time to develop regulations related to BC aquaculture.⁹ Justice Hinkson recognized that the land beneath salmon farms is the property of the provincial government, so he ruled tenure decisions to be within the jurisdiction of the province.

I describe the evidence about the federal and provincial roles, both historical and present, in the sections below.

Concerns about salmon farms

Up to the close of evidentiary hearings (and public submissions) on September 28, 2011, I had received 306 submissions about salmon farms through the Commission’s website. Forty-four of these were submissions on an evidentiary issue (whether a document should become an exhibit in the

hearings); the remaining 262 submissions related to more substantive issues.

The majority (245) of the substantive submissions relating to salmon farming were from people opposed to salmon farming. Almost half of those expressing opposition to salmon farms advocated for the removal of farms from the migration paths of wild salmon or from coastal waters altogether. A similar number advocated for a mandatory transition toward some form of closed containment technology for salmon farms. Those concerns that potentially relate to Fraser River sockeye can be summarized as follows:

- 1 Many submissions expressed concern about the possible spread of disease and pathogens from salmon farms to wild salmon – more specifically, concern that juvenile sockeye migrating in proximity to salmon farms suffer from parasites, such as sea lice, or diseases. A few submissions received before September 28, 2011, expressed concern about the risk of introduction of infectious salmon anemia virus (ISAV) through egg importations. A few submissions also advocated for allowing and funding Dr. Kristina Miller, a DFO research scientist, to test farmed salmon for parvovirus and/or a mortality-related genetic signature.
- 2 Many submissions expressed concern that wild salmon suffer negative effects from salmon farm pollution.
- 3 A common issue of concern was the transparency and accountability of DFO and the aquaculture industry for harm to Fraser River sockeye from the operation of salmon farms. Concerns related to a lack of access to, and collection of, records relating to disease outbreaks, and to a perceived lack of public information about fish farm operations and treatments and chemicals used on the farms.
- 4 A number of submissions expressed concern about DFO having conflicting mandates to both promote aquaculture and preserve wild stocks such as Fraser River sockeye. Some felt that the department’s conservation mandate had been supplanted by the promotion of aquaculture and suggested that separate agencies are needed to avoid this conflict. There were also concerns that the regulation of aquaculture is too weak or not enforced

effectively enough to protect sockeye from the potential harmful effects of salmon farms.

A smaller number (12) of public submissions were from people who support the salmon-farming industry. These submissions make the following points:

- 1 Salmon farming is not related to declines in Fraser River sockeye; stocks were declining before there were salmon farms, and the record return of 2010 shows there can be good runs despite salmon farms.
- 2 Sea lice are not harming Fraser River sockeye, and research that claims otherwise is flawed.
- 3 Salmon aquaculture reduces the pressure to harvest wild stocks such as Fraser River sockeye. Consumer demand for salmon can be met only through farming.
- 4 Salmon farms are essential to the economies of coastal communities, providing employment in remote communities and being the third largest employer in Campbell River.

An even smaller number (five) of submissions provided information (such as suggestions of researchers or information sources for the Commission to explore) without indicating whether the submitters were supportive of the industry.

As explained further in Chapter 9, Fish health management, in November 2011, I decided to reopen the hearings (and public submissions) to hear evidence on recent testing for ISAv in British Columbia. I received 25 public submissions related to ISAv testing, and 156 submissions requesting that the ISAv hearings be live streamed. The 25 submissions about testing aligned with three themes:

- 1 Frustration with DFO, claiming the department is in denial of the presence of ISAv in British Columbia waters.
- 2 Concern that laboratory testing for ISAv has been politicized, advocating that testing for ISAv ought to be carried out by independent third parties, with complete separation from the government. Other submissions said DFO must be proactive in testing for ISAv and developing a course of action in the event ISAv is present in British Columbia.

- 3 Concern about allowing net-pen salmon farms to continue to operate in British Columbia, stating that, given the threat of ISAv infection, salmon farms should be moved onto land. One submission stated that, at the very least, no new licences or renewals should be awarded until more is known about ISAv in the province.

Many of the concerns in public submissions and at the public forums were explored during the evidentiary hearings on disease and aquaculture and in the hearings on ISAv testing. I address some of the scientific issues in Volume 2 of this Report. I discuss management issues in both this chapter and the next.

■ Regulatory roles and management programs

Evolution of aquaculture regulation

In September 1988, Canada and British Columbia signed the Memorandum of Understanding on Aquaculture Development (1988 MOU). In broad terms, the 1988 MOU set out that Canada and British Columbia would co-operate and divide responsibilities for aquaculture such that both jurisdictions would be involved in research and development; the province would license operations; licence applications would be referred to Canada for comment; and both jurisdictions would co-operate in information sharing and compliance and inspection activities.¹⁰ Soon thereafter, British Columbia passed its *Fisheries Act* and its *Aquaculture Regulation*.¹¹

In 1995, the province imposed a moratorium on the approval of new fish farms in British Columbia and asked the BC Environmental Assessment Office to conduct a review of the regulation of salmon farms. The BC Environmental Assessment Office released its report, known as the Salmon Aquaculture Review (SAR), in 1997. The report concluded that “salmon farming in B.C., as presently practiced and at current production levels, presents a low overall risk to the environment.”¹² The SAR report

contained 49 recommendations related to farm siting, escaped farmed salmon, farm and wild fish health, waste discharges, interactions with coastal mammals and other species, First Nations issues, managing risk and uncertainty, alternative salmon-farming technology, dispute avoidance and resolution, and implementation.¹³

In response to the SAR, in 2000 the province established the Fish Farm Review Committee, with representatives from provincial ministries and DFO, to review all existing farms in British Columbia to identify farms requiring relocation.¹⁴ Gavin Last, assistant director of the province's Policy and Industry Competitiveness Branch (responsible for aquaculture program administration), testified that, between 2000 and 2002, the provincial government reviewed the existing farm locations for environmental, economic, and social impacts (as discussed below in the section on siting and licensing of salmon farms).¹⁵ During this relocation period, the province continued its moratorium on new salmon farms, maintaining the number of salmon tenures at 121. The province lifted the moratorium in September 2002.¹⁶

The SAR also prompted the development of a joint application regime between provincial and federal agencies with responsibilities for salmon farms. Mr. Last described how the Fish Farm Review Committee, replaced by the Project Review Team in 2003, screened salmon farm applications for completeness.¹⁷ The province also produced a guide for marine finfish aquaculture applications, setting out the information requirements and the application process.¹⁸ The Project Review Team's work is described further in the discussion below on siting and licensing of salmon farms.

Also in the early 2000s, the province developed Atlantic salmon escape regulations; initiated a Fish Health Auditing and Surveillance Program; developed the *Finfish Aquaculture Waste Control Regulation* (FAWCR);¹⁹ developed a sea lice monitoring program for the Broughton Archipelago; and made Fish Health Management Plans (FHMPs) a required element of provincial salmon farm licences.²⁰ For more information on fish health surveillance, sea lice monitoring, and FHMPs, see Chapter 9, Fish health management.

By the mid-2000s, the 1988 MOU had become outdated and the industry as a whole, as well as the working relationship between governments,

had changed. Similarly, issues of significance had changed (e.g., sea lice emerged as an issue of concern).²¹

In 2005, DFO published *Canada's Policy for Conservation of Wild Pacific Salmon* (Wild Salmon Policy, or WSP) (see Chapter 10, Wild Salmon Policy). The WSP recognized that the expansion of salmon aquaculture "has not been without controversy."²² It recognized that aquaculture operations pose risks to wild salmon and set out how these risks are managed:

These potential impacts to wild salmon include: the chance of disease and parasite transfer, competition and genetic effects of escapes, and physical disturbances in near-shore environments. Risks are addressed through mitigation measures such as Fish Health Management Plans, improved cage structures and proper farm siting.²³

Then in February 2009, the BC Supreme Court released the decision of Justice Hinkson (the *Morton v. British Columbia (Agriculture and Lands)* decision), noted above.²⁴ Justice Hinkson struck down parts of the provincial *Fisheries Act*, the *Farm Practices Protection (Right to Farm) Act*, and British Columbia's *Aquaculture Regulation* pertaining to finfish aquaculture, and the entirety of the FAWCR.²⁵ However, Justice Hinkson recognized that "the land beneath the fish farms is the property of the provincial government," so he did not declare tenure decisions to be outside the jurisdiction of the province.²⁶ Justice Hinkson delayed the effect of his decision for 12 months, to February 2010, to provide time for the federal government to develop sufficient legislation to regulate fish farms.²⁷ In response to an application from Canada, the court extended the deadline to December 2010.²⁸

As a result of the *Morton* decision, in November 2009, DFO released a discussion document about the development of federal regulations for British Columbia aquaculture and a National Aquaculture Strategic Action Plan Initiative, and it organized a number of "regulatory and developmental action planning meetings" in British Columbia.²⁹ In July 2010, the proposed federal *Pacific Aquaculture Regulations* (PAR) under the *Fisheries Act* were posted to the *Canada Gazette* Part I.³⁰ Consultations leading up to the PAR are described later in this chapter.

The PAR, which came into force on December 18, 2010, apply to aquaculture in the territorial sea of Canada off the coast of British Columbia; the internal waters of Canada off the coast of British Columbia that are not within the province; the internal waters of Canada in British Columbia; and any facility in the province from which fish may escape into Canadian fisheries waters.³¹ The PAR allows the minister to issue aquaculture licences (section 3). Section 4 is the key provision; it enables the minister to make conditions of licence for the proper management and control of the fishery. The PAR also includes prohibitions on aquaculture operators keeping incidental catch (section 5) and operating without a licence (section 7).

In December 2010, Canada and British Columbia signed the Canada–British Columbia Agreement on Aquaculture Management (2010 Agreement). The 2010 Agreement replaced the 1988 MOU and articulated an agreement that took into account the changed jurisdictional picture arising after the *Morton* decision. The preamble to the agreement notes that Canada and British Columbia “share the common goal of having an economically, socially and environmentally sustainable aquaculture sector in British Columbia,” and that the parties “recognise the need to develop collaborative regulatory and management arrangements designed specifically for the Province.”³²

The 2010 Agreement sets out areas of federal and provincial responsibilities. It provides that “Canada may issue aquaculture licences under the *Fisheries Act* for all aquaculture activities to be undertaken in the province of British Columbia” and that “British Columbia may issue land tenures under the *Land Act* for aquaculture purposes.” The 2010 Agreement provides for the sharing of information; collaboration on public reporting; and coordination of inspections, compliance, and enforcement activities. It indicates that DFO is the lead federal agency for the management of aquaculture in British Columbia, while the provincial Ministry of Agriculture will “represent a provincial view on such matters in dealing with Canada.” Further, it states that the parties will establish a Management Committee to oversee implementation of the 2010 Agreement.³³

On December 19, 2010, DFO issued licences to all salmon farms that were then licensed by the province. At the time of the hearings on aquaculture

in August and September 2011, the department was still in the process of developing policies to support implementation of the PAR.³⁴ The state of federal regulatory development for salmon farms is discussed further below.

Provincial ministries

Until December 2010, when DFO issued aquaculture licences under the PAR, the province divided its responsibilities for aquaculture among a Licensing and Compliance Branch that carried out licensing responsibilities for aquaculture; a Lands Branch that focused on licensing the Crown land use of the seabed; and an Aquaculture Branch that housed other regulatory staff and the veterinarians who conducted fish health work. As a result of ministry reorganizations, these groups have been housed in different ministries over the years, and called different things, but their basic roles remained constant.³⁵

In the 1990s, the Licensing and Compliance Branch and the Aquaculture Branch were the responsibility of the Ministry of Fisheries. The provincial government ended that ministry in the early 2000s, and the responsibility for aquaculture moved to the Ministry of Agriculture, Food and Fisheries. In the mid-2000s, aquaculture moved to the Ministry of Agriculture and Lands (BCMAL). As of August 2011, a smaller aquaculture group was located within the Ministry of Agriculture, along with the Animal Health Branch.³⁶ For ease of reference, the provincial ministry historically responsible for licensing and regulating aquaculture is referred to in this chapter as BCMAL.

Similarly, the Lands Branch has been housed in different organizational structures, including at one time Land and Water BC and then the Integrated Land Management Bureau under BCMAL. As of the hearings on salmon farms in August and September 2011, the Ministry of Forests, Land and Natural Resource Operations (MFLNRO), had responsibility for provincial land tenures. A service organization called FrontCounter BC receives and handles land tenure applications, such as those for aquaculture sites, and forwards them to the appropriate reviewing agencies.³⁷

The BC Ministry of Environment (MOE) has historically been involved in the monitoring of salmon farm operations and the administration of

the *Environmental Management Act* and associated regulations related to aquaculture activities.³⁸ This ministry has also undergone name changes, at some points in the recent past being called the Ministry of Environment, Lands and Parks or the Ministry of Water, Land and Air Protection.³⁹

Figure 1.8.2 is a diagram showing the organization of provincial responsibilities for aquaculture in approximately 2004 or 2005, after the lifting of the moratorium that was in place during and following the SAR.

Federal departments

Federally, DFO is the lead department for salmon farming. In British Columbia, DFO's role has expanded as a result of the *Morton* decision. British Columbia is the only province in which DFO licenses salmon farms.⁴⁰

DFO divides its responsibilities for aquaculture between national headquarters and its regional offices. The department delivers most of its responsibilities for aquaculture through the national Aquaculture Management Directorate (AMD). AMD's regional offices are called Regional Aquaculture Coordination Offices (RACOs).⁴¹

As of June 2011, nationally, AMD is situated under the Programs sector (see discussion of sectors in Chapter 4, DFO overview). AMD is headed by a director general, who reports to the assistant deputy minister of programs.* Four directors / managers report to the director general. These directors / managers have responsibility for stewardship, innovation and sector strategies, certification and sustainability reporting, and the national aquaculture secretariat.⁴² Additionally, in Ottawa, an executive director of aquaculture operations reports to the senior assistant deputy minister, Ecosystems and Fisheries Management. AMD nationally has a functional relationship, but not a reporting one, with the RACOs.⁴³ (The management model is described in Chapter 4, DFO overview.)

The director of aquaculture management in the Pacific Region RACO reports to the regional director of fisheries management, who in turn reports to the regional director general.[†] The regional director general has a functional reporting relationship to the assistant deputy minister, Ecosystems and Fisheries Management (see section on Fraser River sockeye fisheries management structure in Chapter 5, Sockeye fishery management).⁴⁴

The Pacific Region RACO has approximately 54 staff – 44 of whom were added in response to the federal assumption of licensing responsibilities in British Columbia – organized into three sections: Aquaculture Resource Management, Aquaculture Environmental Operations (AEO), and Aquaculture Program Group. Aquaculture Resource Management is responsible for developing the Integrated Management of Aquaculture Plans (IMAPs), discussed below. AEO includes biologists and veterinarians who assess aquaculture projects and monitor fish health and environmental issues. AEO staff work out of offices in Courtenay, Campbell River, and Port Hardy. The Aquaculture Program Group, centred at regional headquarters, conducts work related to governance coordination, Aboriginal engagement, ecosystem approach, and other region-wide issues.⁴⁵

In addition to staff in the AMD, two licensing agents in the DFO's South Coast area office are responsible for issuing aquaculture licences.⁴⁶

With the shift in operational responsibilities to the federal government, DFO's Conservation and Protection Directorate (C&P) received funding for a dedicated aquaculture program in British Columbia. C&P regionally has 12 FTEs, including eight fishery officers, dedicated to aquaculture.⁴⁷ The area chief for aquaculture leads the program and reports to the regional director of C&P* (For a more detailed description of C&P, see Chapter 7, Enforcement.)

Figure 1.8.3 shows the organizational structure of the Pacific Aquaculture Regulatory Program (PARP).

AMD delivers its work principally through two programs: nationally, through the Sustainable Aquaculture Program (SAP); and regionally, through

* Trevor Swerdfager, who testified before the Inquiry, was the director general of AMD from 2007 to March 31, 2011 (see Exhibit 1578). At the time of the hearings in August and September 2011, this position was filled by Guy Beaupré.

† At the time of the hearings in August and September 2011, the director of aquaculture management was Andrew Thomson, and the regional director general was Susan Farlinger, both of whom testified before the Inquiry.

‡ As of August 2011, the area chief of aquaculture was Brian Atagi. As of July 2011, the regional director of C&P was Randy Nelson. Both Mr. Atagi and Mr. Nelson testified before the Inquiry.

Province of British Columbia
Ministry Aquaculture Responsibilities

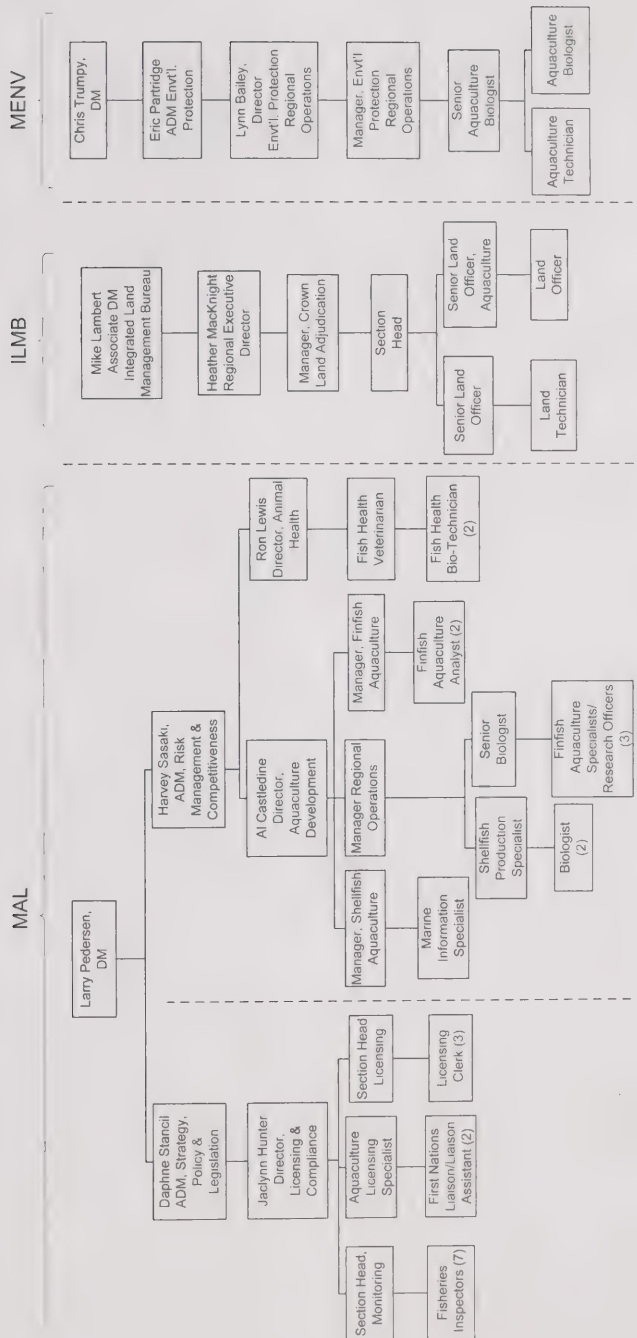


Figure 1.8.2 Organization of provincial responsibilities for aquaculture, circa 2004-5 (Ministry of Agriculture and Lands, Integrated Land Management Bureau, and Ministry of Environment)

Source: Reproduced from Policy and Practice Report 20, Aquaculture, p. 28.

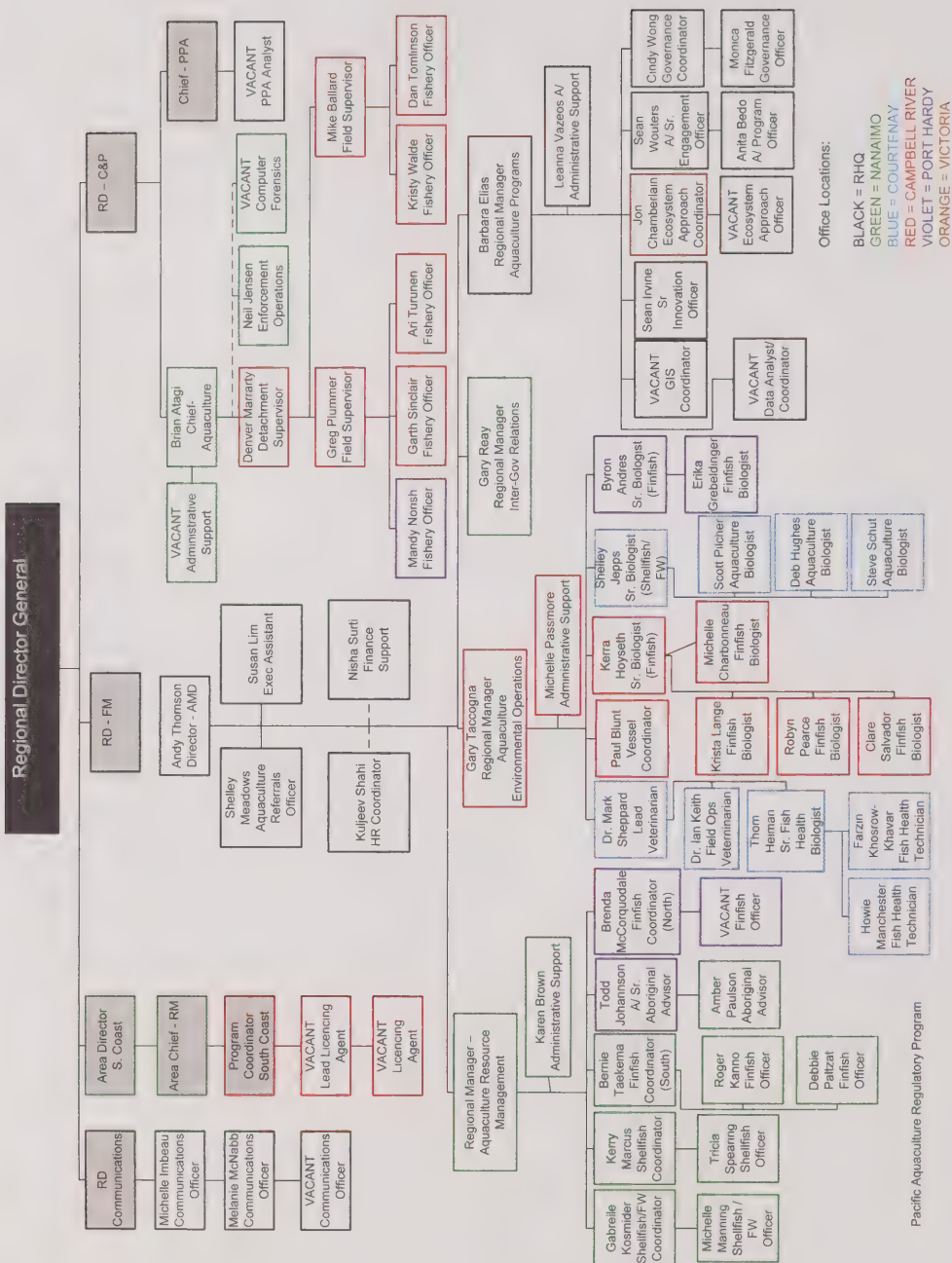


Figure 1.8.3 Pacific Aquaculture Regulatory Program (2011)

Source: Reproduced from Exhibit 1581.

the Pacific Aquaculture Regulatory Program. Since 1991, DFO has also run an Atlantic Salmon Watch Program (ASWP).

Other federal departments with significant responsibilities related to salmon farming include the following:

- Transport Canada approves salmon farms that may be situated in navigable waters. It may conduct reviews under the *Canadian Environmental Assessment Act*⁴⁹ in respect of such works (see the discussion below on siting and licensing salmon farms).*
- The Canadian Food Inspection Agency is responsible for the administration of the *Health of Animals Act*,⁵⁰ its related regulations, and the *Feeds Act*.⁵¹ It also co-administers with DFO the National Aquatic Animal Health Program (see discussion in Chapter 9, Fish health management).
- Environment Canada issues “disposal at sea” permits for fish waste under the *Canadian Environmental Protection Act, 1999*⁵² (see discussions in chapters 6, Habitat management, and 7, Enforcement), as well as “scare” permits to salmon farms in relation to migratory birds through the Canadian Wildlife Service. As discussed in the habitat management chapter, Environment Canada has administrative responsibility for section 36 of the *Fisheries Act*.

Sustainable Aquaculture Program

The Sustainable Aquaculture Program is a \$70 million national program, running from 2008 to 2013, designed to enhance “global competitiveness and environmental performance of Canada’s aquaculture industry.”⁵³ A backgroundunder on the program sets out the funding for SAP’s “four pillars to modernize and strengthen Canada’s aquaculture industry”:

- \$13 million for governance and regulatory reform, which “focuses on streamlining federal, provincial and territorial regulations and policies”;

- \$22 million for scientific regulatory research, which “is to strengthen scientific knowledge and advice that supports performance-based environmental standards”;
- \$25 million for innovation “to enhance the sector’s competitiveness and productivity”; and
- \$10 million to support “the aquaculture sector’s ability to meet domestic market demands and rigorous international trade and marketing requirements.”⁵⁴

Trevor Swerdfager, former national director general of DFO’s AMD, explained that a large portion of the SAP funding (the \$22 million noted above) has gone to DFO’s Science Branch to support the regulatory agenda. He also said that the goals listed in the SAP backgroundunder of making industry “successful” and “competitive” do not “appropriately address the true mandate of the program, which is the sustainability dimension” of the aquaculture industry in Canada.⁵⁵

The Program for Aquaculture Regulatory Research (PARR) is a component of SAP.⁵⁶ PARR is designed to “create new knowledge and methods that will support the development of better advice required for policy and decision making and in particular, ecosystem-based management.”⁵⁷ Research conducted under PARR must be short term (one to two years), conducted by DFO scientists, and related to the department’s annual research priorities.⁵⁸ As explained by Mr. Swerdfager, each year PARR releases a call for proposals to departmental scientists announcing the research priorities, which are developed jointly by AMD and the Science sector.⁵⁹ Proposals are reviewed by the PARR Review Committee and approved by DFO Science senior management. In 2009/10, PARR supported eight research projects relating to two identified priorities: fish health management and siting requirements.⁶⁰ In 2010/11, PARR identified the Pacific Region’s priorities as wild–farmed interactions and sea lice management, and the “characterization of the susceptibility of wild Pacific salmon populations to sea lice infection.”⁶¹ The PARR 2010/11 funding cycle allocated a maximum of \$300,000 to five (Pacific

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 1, enacts the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEAA may not reflect the current law respecting environmental assessment in Canada or the applicability of environmental assessments to salmon farms.

Region) DFO scientists related to the following objectives: “to conduct laboratory studies to describe the susceptibility of juvenile [P]acific salmon to sea lice infection,” “to monitor wild salmon populations to identify when and where vulnerable populations are located in relation to fish farms,” and “to model sea lice dispersal along with the migration routes of Pacific salmon.”⁶²

DFO administers other national programs using SAP funds, such as the Aquaculture Collaborative Research and Development Program (ACRDP) and the Aquaculture Innovation and Market Access Program (AIMAP).⁶³ ACRDP is an “industry driven program that teams industry with DFO researchers” to meet the program’s goals of improving competitiveness of the aquaculture industry, increasing collaboration between DFO and industry on scientific research to enhance aquaculture, facilitate and accelerate technology transfer, and increase scientific capacity for essential aquaculture research and development. ACRDP funding is approximately \$4.5 million annually.⁶⁴ AIMAP provides \$4.7 million annually (for five years, starting in 2008) in national grants “focusing on the competitiveness of existing products, new species development, environmental performance, and market access.”⁶⁵ AIMAP is

“a nationally competitive process with calls for proposals issued on an annual basis[.]”⁶⁶

Pacific Aquaculture Regulatory Program

The Pacific Aquaculture Regulatory Program, an ongoing management program for aquaculture in British Columbia, was begun in 2010 to implement the PAR. It costs \$8.3 million annually in A-based funds. This program received an additional \$4 million in 2010 and \$2 million in 2011 to purchase equipment and vessels and to develop an aquaculture information management system.⁶⁷ As of September 2010, work under PARP had focused on implementing aquaculture licensing. DFO had also begun to develop a number of policies to support this work, as described below.

At the time of the Commission’s hearings on salmon farms, DFO was in the process of developing a Sustainable Aquaculture Fisheries Framework (SAFF) that “will guide licensing and management of the sector” under PARP.⁶⁸ SAFF is depicted in Figure 1.8.4.

DFO is developing three suites of operational policies under SAFF and intends to roll them out sequentially. In August 2011, Andrew Thomson, regional director of the AMD, DFO Pacific Region,

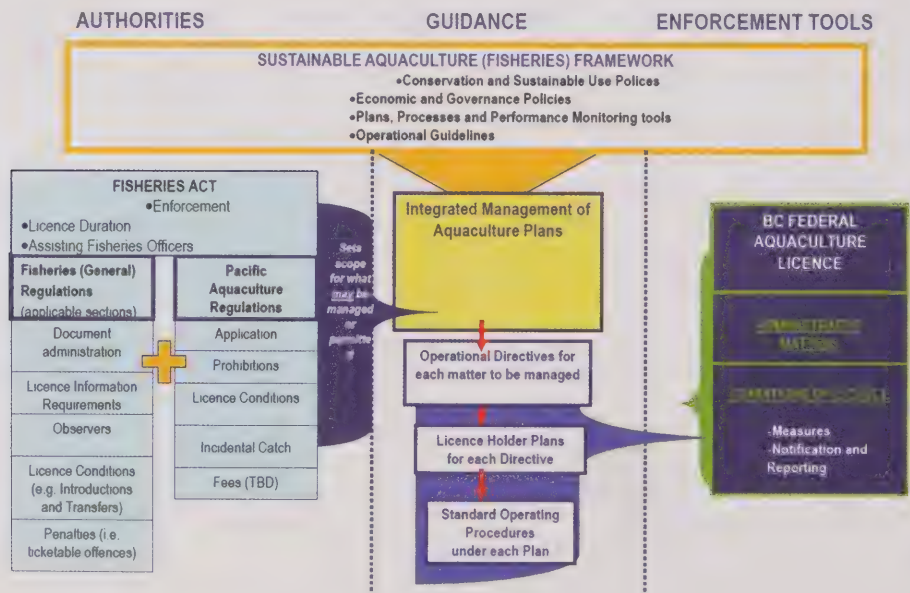


Figure 1.8.4 The Sustainable Aquaculture Fisheries Framework

Source: Exhibit 1591, p. 20.

testified that a first suite of policies – including the sustainable aquaculture framework, the licensing approach, and a public reporting approach – had completed the departmental approval process.⁶⁹ At that time, DFO was working on a second suite of environmental management policies and planned to work on a third suite of policies in 2012 related to such things as the precautionary approach, species at risk, and revisions to the 2002 Aquaculture Policy Framework (discussed below).⁷⁰ The following policies – in draft at the time of hearings in August and September 2011 – were in evidence before me:

- A Sustainable Aquaculture Fisheries Framework, June 29th, 2011 (DRAFT);⁷¹
- Public Reporting of Regulatory Information Under the British Columbia Aquaculture Regulatory Regime, June 29th, 2011 (DRAFT);⁷²
- Aquaculture Licensing Approach, June 29th, 2011 (DRAFT);⁷³
- Identification and Management of Environmental Impacts of [*sic*] Under the British Columbia Aquaculture Regulatory Regime, June 29th, 2011 (DRAFT);⁷⁴
- Ecosystem-Based Approach to Aquaculture Management (DRAFT);⁷⁵
- Approach to Managing Feed-Related Organic Deposition in Aquaculture (DRAFT);⁷⁶
- Integrated Management of Aquaculture Plans (IMAPs) Guidance (DRAFT);⁷⁷
- Policy on the Access to Wild Aquatic Resources as it applies to Aquaculture Discussion Document, March 9, 2011 (Draft for Discussion);⁷⁸
- Approach to Managing Non Feed-Related Organic Deposition in Aquaculture (DRAFT);⁷⁹
- Approach to Fish Health (DRAFT);⁸⁰
- Approach on the Use of Noise (DRAFT);⁸¹
- Approach on the Use of Light (DRAFT);⁸²
- Approach to Managing Fish Transfer, Removal and Production in Aquaculture Facilities (DRAFT);⁸³ and
- Approach to Chemicals and Litter Management at Aquaculture Sites (DRAFT).⁸⁴

Under SAFE, DFO intends to develop IMAPs to guide aquaculture management. Mr. Thomson

testified that the department expected to release a draft IMAP in the fall of 2011. Like Integrated Fisheries Management Plans (IFMPs) (see section on IFMPs in Chapter 5, Sockeye fishery management), the IMAP is both a process and a document. As a process, it is intended to “enhance First Nations, industry and stakeholder engagement in decision-making regarding management and conservation measures affecting aquaculture activities.” As a document, an IMAP is a reporting tool and contains sources of information on the sector. DFO will develop “sectoral” IMAPs for the finfish and shellfish aquaculture sectors. These plans may be supplemented in the future with specific-area measures that could be attached to the sector IMAPs. DFO also intends to take an ecosystem approach to the management of aquaculture.⁸⁷ (For more information on that approach, see Chapter 4, DFO overview.) Its draft policy, *Ecosystem-Based Approach to Aquaculture Management*, describes the ecosystem approach, which

involves protecting ecosystem features by managing the risks caused by human pressures on ecosystems, taking into account the provision of ecosystem goods and services that ultimately benefit societies and economies. This involves incorporating ecosystem information into management decision-making, and takes into account science advice at the ecosystem levels, and uses precaution in management where there are uncertainties.⁸⁸

Mr. Swerdfager testified that it is difficult to translate an “ecosystem approach” into specific management decisions and actions. Nevertheless, he is confident that DFO will be able to take a systems-based approach to aquaculture.⁸⁹

Regarding other aspects of PARP, Mr. Thomson testified that, during the summer of 2011, DFO began to conduct audits, inspections, and complaint investigations, and began consulting on a review of the conditions of licences that were issued in December 2010.⁹⁰

Atlantic Salmon Watch Program

One of the prominent early concerns about finfish aquaculture in British Columbia was that Atlantic salmon would escape from aquaculture facilities,

establish as wild populations, and then compete with wild Pacific salmon for food and habitat. Another concern was the potential for escaped salmon to spread disease to wild fish.⁹¹

In 1991, DFO initiated the Atlantic Salmon Watch Program as a research program. The ASWP's objective is to "study the abundance, distribution and biology of Atlantic salmon in British Columbia and its adjacent waters." The ASWP monitors reports of Atlantic salmon observations from commercial and recreational fishers, fish processors, government and independent field staff, and hatchery workers. The ASWP has a toll-free reporting line, and the DFO website provides information about how to distinguish Atlantic salmon from Pacific salmon.⁹²

The PAR allow the minister to specify, under the conditions of licence, "the measures that must be taken to minimize the escape of fish from the aquaculture facility and to catch the fish that escape," and "the records that must be kept in relation to ... any major failure of the aquaculture facility's containment structures and the quantity of any fish that escape from the facility."⁹³ Among other things, the conditions require licence holders to do the following:

- take all reasonable measures to prevent escapes;
- have a written escape response plan;
- take immediate corrective action to control, mitigate, remedy, and confine an escape or suspected escape;
- submit monthly reports to the department;
- report escapes within 48 hours;
- undertake a number of prescribed activities to recapture escaped Atlantic salmon; and
- submit to the department a report of the results of a recapture within 48 hours of the recapture.⁹⁴

A proposed federal Aquaculture Act

The B.C. Salmon Farmers Association (BCSFA) submitted documentary evidence suggesting an Aquaculture Act may be a better way to regulate the industry than through the *Fisheries Act*. The Canadian Aquaculture Industry Alliance (CAIA) has proposed an Aquaculture Act that would recognize aquaculture as a "food production

practice which takes place with fish as private property and occurs in legally defined private spaces."⁹⁵ CAIA says an Aquaculture Act would, among other things, define aquaculture, legitimize it as a business, define and authorize common farming practices, and provide a framework for the planning of aquaculture development in Canada.⁹⁶

In testimony, Mr. Swerdfager said his views on a separate Aquaculture Act "have waffled a little bit over the years ... I think the key thing is that it would be ideal for options to be put before our government to select from as to how best Parliament may want to express itself with respect to aquaculture."⁹⁷

Claire Dansereau, deputy minister, testified that she does not have a "solid opinion" of whether an Aquaculture Act ought to be developed. She said "that the fisheries management should be done as part of an integrated system," and that she did not want to create obstacles to joint management of wild and farmed fish by having these responsibilities split over different departments. In her view, if separate legislation for aquaculture were to be developed, aquaculture should continue to be managed by DFO to prevent a loss of integration in managing the fisheries.⁹⁸

In contrast to the CAIA proposal, David Bevan, associate deputy minister, testified that a new Aquaculture Act is not necessary to give a legal definition of "aquaculture" or to set the rights and responsibilities of fish-farm operators, because those issues have been covered within the new federal regulatory regime. He also said that, at this time, DFO is not prepared to recommend an Aquaculture Act, even though Ms. Dansereau testified that DFO is actively discussing this issue.⁹⁹

DFO's mandate for aquaculture

One of the issues before me is whether DFO has conflicting mandates with respect to both promoting salmon aquaculture and regulating salmon farms to protect wild salmon stocks. In addition to public submissions, evidence on this issue included testimony from DFO, the province, and representatives from industry and the environmental community, along with documentary evidence about the department's policies and programs.

Catherine Stewart, salmon farming campaign manager for the Living Oceans Society and a representative of the Coastal Alliance for Aquaculture Reform (CAAR), testified that she does not believe it is possible for DFO to successfully both promote and regulate the aquaculture industry. She said the “constitutional mandate to protect ocean and ecosystem health and wild stocks” conflicts with the “political mandate in recent years to be a promoter and an advocate for the aquaculture industry.”¹⁰⁰ Ms. Stewart said that “those two mandates have to be separated” and suggested that the promotion of aquaculture could go to “Industry or Trade Canada or other departments supporting Canadian businesses,” such as Agriculture Canada.¹⁰¹ “[T]here are a lot of good people and very well-intentioned and very dedicated people in DFO,” she said, but “they’re constrained by the political mandate.”¹⁰²

Mr. Swerdfager did not see DFO to be in a conflict, saying the department can regulate aquaculture and protect wild salmon while promoting the aquaculture industry. In his view, the department is “uniquely well placed” to be “actively engaged in protecting the environment, developing our economy and working at the social scale” as a result of DFO’s “science presence,” its close work with industry, stakeholders, and communities, and its understanding of the dynamics of industry. These things, he said, enable DFO to work with industry toward “sustainability-premised solutions.” Mr. Swerdfager said he finds it “deeply offensive” when “people tell us that we are being unduly biased toward industry.”¹⁰³

Ms. Dansereau recognized the “perception” of a conflict, but she did not agree that DFO has “divided loyalties.” She said, “I believe that we are doing our job as regulators, both of the wild fishery and of the aquaculture fishery, that we view both as fisheries, as the courts have described, and it’s our responsibility to both regulate and promote both of them.” She further stated that DFO does not do marketing for aquaculture; rather, it assists with “market access.” She said that the department’s job is to “show the world that the Canadian products are safe, Canadian products are sustainable, and that’s because we are the regulators that we can speak with a certain

amount of authority on those areas, and that’s the extent of our involvement.”¹⁰⁴ With regard to the market access work carried out by DFO, documentary evidence refers to proposals and work completed by the department in promoting aquaculture projects, jointly with industry, through briefing sessions with seafood retailers such as Safeway.¹⁰⁵ Mr. Thomson described how he was part of a group that met with California senators concerning BC salmon farms.¹⁰⁶ Mr. Swerdfager said that he and another DFO staff member travelled to the Boston Seafood Show.¹⁰⁷

In later testimony, Ms. Dansereau said that DFO has considered the “potential that we may be perceived to have some conflict between being the regulator and working with the industry” in respect of the application and administration of section 36 of the *Fisheries Act* to salmon farms. Indeed, she said that “it’s very difficult, in some of these circumstances, for the minister of fisheries and oceans on certain files. So it would be better left to potentially another minister doing this[.]” That is why she thought Environment Canada may be better suited than DFO to enforce section 36 of the *Fisheries Act** against salmon farms.¹⁰⁸

Mr. Last acknowledged that there are conflicts and complexities within government in any resource development area. He said when the province was the lead regulator, it attempted to “create some separation between the functions of resource development and enforcement, to keep them separate, and as much as possible, avoid any kind of a conflict.”¹⁰⁹ Dr. Ian Fleming, professor at the Ocean Sciences Centre of Memorial University in Newfoundland and Labrador, similarly explained that in Norway four distinct ministries have a role in aquaculture, and research wings are privatized to create a degree of independence from aquaculture management.¹¹⁰ Clare Backman, an industry representative from Marine Harvest Canada, said there “appears to be a conflict,” but noted that, in “the modern system of governance, it’s quite common that you have an agency that actually plays dual roles.”¹¹¹ Mia Parker, another industry representative, formerly the manager of regulatory affairs at Grieg Seafood, said, “[I]f you accept the premise that aquaculture is a fishery, then this approach to management is consistent

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Section 150 amends the *Fisheries Act* (a new s. 43.2) to allow cabinet to designate another minister as the minister responsible for the administration and enforcement of ss. 36(3) through (6).

with how other commercial fisheries are managed in Canada[.]”¹¹²

The overarching national policy framework for aquaculture reveals the tension in DFO’s mandate. In 2002, the department released DFO’s Aquaculture Policy Framework to guide sustainable development of aquaculture in Canada.¹¹³ This national policy framework confirmed DFO’s role as the lead federal agency on aquaculture, set out DFO’s vision of “sustainable aquaculture development,” and set out nine policy principles to guide the department’s work on aquaculture. These principles are listed in the policy framework:

Principle 1. DFO will support aquaculture development in a manner consistent with its commitments to ecosystem-based and integrated management, as set out in departmental legislation, regulations and policies.

Principle 2. DFO will address issues of public concern in a fair and transparent manner, based on science and risk-management approaches endorsed by the Government of Canada.

Principle 3. DFO will communicate with Canadians and be informed by their views on issues pertaining to aquaculture development.

Principle 4. DFO will respect constitutionally protected Aboriginal and treaty rights and will work with interested and affected Aboriginal communities to facilitate their participation in aquaculture development.

Principle 5. Recognizing that aquaculture is a legitimate use of land, water and aquatic resources, DFO will work with provincial and territorial governments to provide aquaculturists with predictable, equitable and timely access to the aquatic resource base.

Principle 6. DFO will strive to ensure that its own legislative and regulatory frameworks enable the aquaculture sector to develop on an even footing with other sectors.

Principle 7. In partnership with other federal departments, the provinces and territories, the academic sector and industry, DFO will sup-

port responsible development of the aquaculture sector.

Principle 8. DFO will make every effort to understand the needs of the aquaculture industry and to respond in a manner that is solutions oriented and supportive of aquaculture development.

Principle 9. DFO will work with other federal departments and with provincial and territorial governments to coordinate policy development, integrate regulatory frameworks, and improve service delivery.¹¹⁴

Principles 1 and 4–9 make it clear that DFO is to support aquaculture development and to provide service to the aquaculture industry. This lead national policy on aquaculture does not mention the protection of either fish habitat or wild stocks, though those considerations might be inferred through Principle 1 by the reference to “ecosystem-based ... management”; Principle 2 by a reference to “risk-management”; and Principle 7 by a reference to “responsible development.”

National funding of aquaculture, including \$70 million for SAP, discussed above, also demonstrates the federal government’s direction that DFO promote aquaculture. Indeed, \$25 million of that funding is to promote aquaculture through innovation to enhance the sector’s competitiveness, and another \$10 million is to strengthen market access through sustainability certifications. In contrast, I heard no similar evidence of this magnitude of spending on the marketing and promotion of wild fish.

The AIMAP grant program has funded such things as Marine Harvest Canada’s research into soft-flesh suppression technology (\$142,500 in 2009), the Canadian Aquaculture Industry Alliance’s market research for BC farmed salmon producers (\$100,000), and work related to aquaculture standards and certification (\$157,000 and \$75,000).¹¹⁵ Ms. Stewart pointed to spending under this program as demonstrating conflicts and problems in DFO’s priority setting:

You know, where are their priorities? The Department of Fisheries and Oceans should be doing their best to ensure the health of marine ecosystems and wild fish, not subsidizing prof-

itable corporations to contend with internal problems that may affect their profitability. ...

[G]ood husbandry should be the responsibility of a for-profit corporation, not the responsibility of Canadian taxpayers who – and the Department who is currently underfunding Conservation and Protection, and underfunding Science.¹¹⁶

During the hearings, counsel for the Aquaculture Coalition suggested that spending for science conducted under ACRDP (described above) has been for the purpose of rebutting negative public perceptions about the industry.¹¹⁷ He referred to part of a Strategic Review of the ACRDP, completed in 2005:

According to the evidence gathered for the Review, the ACRDP is a relevant and needed program for the Canadian aquaculture industry. Based on domestic and worldwide demand for fish products, the industry has significant potential for growth, provided that certain barriers can be overcome. The industry requires assistance in overcoming a number of challenges that are beyond its ability to address effectively, including technical barriers and challenges related to the environment. *There are also communication challenges as there is a negative perception of aquaculture among certain influential NGOs.*

In bringing a rigorous scientific approach to the issue of environmental impacts associated with aquaculture, ACRDP has the opportunity to clarify some of the misinformation that persists. The industry includes small firms that are marginally profitable and do not have the financial means to invest in research and development that could improve its competitiveness. Projects funded by ACRDP and conducted jointly between industry and DFO scientists are helping to provide answers to issues of optimal fish health, developing new and better species, and best performance practices. The ACRDP therefore has a role to play in the improvement of the industry's competitiveness and the transfer of knowledge from scientists to industry operators. [Emphasis added.]¹¹⁸

Ms. Dansereau responded to the suggestion that science funded under the ACRDP is intended to address negative public perceptions of the industry:

[I]t's to ensure that if there is misinformation that is, in fact, frightening people, real truth would be brought to bear on a question. So the fact that industry is part of that ... doesn't make it suspect, it simply means that real research was being done to uncover real truths. And so it is not a communications exercise, it's a science exercise to get at real answers.¹¹⁹

In contrast to AIMAP and ACRDP, the limited evidence before me indicates that DFO conducts or funds very little research with scientists outside of industry concerned about salmon farms having negative effects on wild stocks. Michael Price, a biologist with the Rainforest Conservation Foundation, testified that he contacted DFO about doing joint work on sea lice and Fraser River sockeye in the Discovery Islands. He said that it was "frustrating" because, although he had been surveying sockeye in that area since 2007, DFO did not talk to him before setting up its own research program.¹²⁰ Dr. Simon Jones, a research scientist with DFO, confirmed that the department has not collaborated with Mr. Price or other researchers in setting up DFO's recent (2010) research work under PARR in relation to sockeye juveniles.¹²¹ (See description of this research in Chapter 9, Fish health management.)

An exception to DFO working with external scientists appears to be the Broughton Archipelago Monitoring Program (BAMP), in which DFO, industry, and CAAR have jointly conducted research related to aquaculture, though BAMP originated as a collaboration between industry and CAAR.¹²² Ms. Stewart testified that CAAR became involved in BAMP hoping the collaboration would stop the "my science / your science" debate, but that progress has been "glacial at best."¹²³ Mr. Backman said that the progress has been slow because "good research takes time."¹²⁴

■ Siting and licensing of salmon farms

Another issue before me is whether siting salmon farms on the Fraser River sockeye migration route poses a risk to wild sockeye, and, if it does, what steps if any should be taken to ensure the

sustainability of wild sockeye. As discussed in Chapter 2, Life cycle, many Fraser River sockeye smolts are thought to migrate up the east side of Vancouver Island, through the Strait of Georgia and Johnstone and Queen Charlotte straits, and into Queen Charlotte Sound. Salmon farms are located along the Fraser River sockeye migration route in the Discovery Islands, east of Vancouver Island, and north of Campbell River. Many participants in this Inquiry, and members of the public who made submissions, are concerned that diseases and pathogens are passed from salmon farms to wild salmon smolts migrating out to sea.

In this section, I review evidence related to siting and licensing of salmon farms. Evidence related to the transfer of pathogens between farmed and wild fish – the main risk described by those opposed to farms being located on the Fraser River sockeye migration route – is discussed in Chapter 9, Fish health management, and in Volume 2, Causes of the Decline.

Licences

Since December 2010, salmon farm operators have required both a form of provincial land tenure and a federal finfish aquaculture licence.

The province normally grants salmon farm operators a form of tenure called a “licence of occupation,” issued for a five- to 20-year period.¹²⁵ The application fee for a new finfish aquaculture tenure is \$4,925, plus HST. Rental fees for each year of a licence of occupation are calculated based on a set “Finfish Land Value” for finfish aquaculture sites – as of April 1, 2010, \$8,901 per hectare. The annual rent is 7.5 percent of the Finfish Land Value for “intensive areas,” and 7.5 percent of one-half the Finfish Land Value for “extensive areas.”*

On December 19, 2010, DFO issued the first federal finfish aquaculture licences under the *Pacific Aquaculture Regulations* (PAR) for an initial period of one year.¹²⁶ Ms. Dansereau testified that she made the decision to roll over, or “grandfather,” provincial

salmon farm licences into federal ones. She said there was no evidence to not grandfather any of the provincial licences, “and we knew that we would be spending a lot of time working to ensure that the [federal] conditions of licence would be well-established by us through consultation in the future[.]”¹²⁷ Further, in making that decision, Ms. Dansereau said the department considered the “unique geography of the Fraser sockeye migration route.” She said there was no need to do a new analysis of farm siting because DFO had been involved in past siting decisions, explaining that “the advice that we have always received from our scientists has always been that there is no threat at this point, or there’s no threat that we are completely aware of[.]”¹²⁸ When asked whether DFO took any steps in 2010 to determine whether the siting criteria remained current before deciding to roll over the licences, Ms. Dansereau testified that “the advice I received was such that the sites as they currently were, were in compliance with the rules that existed and that we would be working with [the salmon farmers] over time to ensure that any future requirements would be met.”¹²⁹

Mr. Thomson testified that, in granting the licences, “we chose not to amend the production amounts or species being licensed at any of the aquaculture facilities, so we would not change those amounts in order to keep, if you will, the status quo in place, recognizing we had a very limited amount of time to consult with First Nations and other parties on any potential changes.”¹³⁰

The maximum length of a licence allowed under the *Fisheries Act* is nine years.¹³¹ Mr. Thomson said that, to provide further opportunities for consultation with First Nations, DFO chose short, one-year durations for the licences for finfish.¹³² Mr. Swerdfager said that, for the same reason, the department planned to again issue one-year licences in December 2011. However, he said DFO would not commit to not issuing multi-year licences after that time, owing to the nature of consultative processes and the length of time they can take.¹³³ Mr. Backman indicated that industry is seeking multi-year licences.¹³⁴

As of September 2011, DFO was not charging industry any fees for aquaculture licences.

* See PPR 20, p. 46. An “intensive area” is defined as “the area of Crown land used for activities and related improvements directly associated with the production of finfish, shellfish or marine plants. The intensive area will include net cages, netting, float camps, net storage, docks and moor sheds as well as a 30-meter buffer around these structures[.]” An “extensive area” is defined as “the area of Crown land used for anchoring structures outside of intensive areas that do not impede navigation or access to lands beyond.”

Mr. Thomson testified that the department would be producing an options and discussion document on licence fees and would consult on licence fees in accordance with the *User Fee Act*.¹³⁵ (See discussion of the *User Fee Act* in Chapter 5, Sockeye fishery management.) Ms. Dansereau testified that whether the aquaculture industry will be charged licence fees would be determined “within the next year or two,” and that DFO is contemplating a fee structure that would be similar to other fisheries.¹³⁶ Mr. Backman, Ms. Parker, and Ms. Stewart all agreed that fish farm companies should be paying licence fees. Ms. Stewart commented that she would like to see the fees go back into “science and work that will benefit the receiving ocean environment” rather than into general revenue.¹³⁷

Consolidation of federal aquaculture permits and authorizations

The federal aquaculture licence incorporates and replaces the following previously issued federal permissions:

- DFO Introductions and Transfer permits for routine transfers as defined by the DFO aquaculture licence;
- Harmful Alteration, Disruption, or Destruction of Fish Habitat Authorizations;
- Permit / authorizations to retain incidental catch;
- Access to wild fish resources for routine access as indicated in DFO aquaculture licences; and
- Nuisance seal permits, previously issued under the Marine Mammal Regulations.¹³⁸

Mr. Swerdfager explained that harmful alteration, disruption, or destruction of fish habitat (HADD) authorizations under section 35 of the *Fisheries Act* are no longer issued for salmon farms because “the matters that were previously addressed by those authorizations are now covered as conditions of licence.”¹³⁹ Since HADD authorizations are not issued, the *Canadian Environmental*

Assessment Act (CEAA) is not triggered by an action under the *Fisheries Act*.¹⁴⁰ However, the CEAA may still be triggered by the *Navigable Waters Protection Act* (NWPA), and, if that occurs, an environmental assessment may be conducted by Transport Canada.¹⁴¹ Mr. Thomson testified that, although there is no longer a *Fisheries Act* trigger for the CEAA, environmental impacts are considered by DFO in the process of licence issuance.¹⁴² (The CEAA is discussed in more detail in chapters 3, Legal framework, and 6, Habitat management.)*

DFO licence decision making

For federal salmon farm licences, the decision level / authority depends on the nature of the decision, as follows:¹⁴³

- *Applications for renewal or involving administrative matters.* These can be addressed by DFO licensing officers. “Administrative matters” could include replacement of a lost licence, changes in contact information, and modifications to management plans and/or supporting protocols where these changes are consistent with policies.
- *Amendments to licence holder name.* These are typically approved by the regional director of Aquaculture Management for the Pacific Region.
- *Technical amendments.* These are typically approved by the regional director of Aquaculture Management for the Pacific Region, after review by DFO technical staff. Technical amendments might include requests to change management plans or related documents, classification of bottom type, benthic monitoring stations, or deletion of a species listed for culture at the facility.
- *Applications requiring special consideration including new sites and others.* These typically require approval by the regional director general. New licences or a significant change to a licence may require an environmental review by DFO and other agencies.

* I note that Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. Part 3, Division 1, enacts the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEAA may not reflect the current law respecting environmental assessment in Canada, or the applicability of environmental assessments to salmon farms.

Until DFO has considered any recommendations with respect to salmon farming made by this Inquiry, the department does not intend to make decisions on applications for new salmon farm sites or for amendments to existing licences that have the potential to result in substantial changes. However, the department is continuing to accept such applications.¹⁴⁴

Conditions of licence

Exhibit 1594 is the generic Finfish Aquaculture Licence 2010 under the *Pacific Aquaculture Regulations*. This 98-page document sets out the conditions attached to each salmon farm licence. The first two pages of the document set out information for a particular farm (such as species, maximum allowable peak biomass, or other site-specific conditions). Mr. Thomson described how the licence conditions include requirements covering record keeping and reporting; developing and adhering to fish health management plans; monitoring for sea lice, pathogens, and disease; and escape prevention provisions.¹⁴⁵ The generic conditions of licence for salmon farms are organized into 19 sections:

1. Application and Licensed Species
2. Peak Biomass
3. Containment Array Requirements
4. Transfer of Fish
5. Fish Health Management Plan
6. Sea Lice Monitoring
7. Fish Health Record Keeping
8. Fish Health Event Response
9. Fish Health and Sea Lice Reporting
10. Escape Prevention, Reporting and Response
11. Incidental Catch
12. Predator Control
13. Protection of Fish Habitat
14. Fish Mortalities
15. Boat Operations
16. Annual Aquaculture Statistical Report
17. Use of Lights
18. Fish Harvest
19. Administrative Matters

The conditions of licence are discussed further below and in Chapter 9, Fish health management.

Salmon farm site applications

In the early 2000s, the federal and provincial governments harmonized the application and referral process for salmon farms. Since the onset of federal regulation in December 2010, FrontCounter BC has continued to receive new aquaculture applications on behalf of both levels of government. Some renewal applications may proceed directly to DFO without going through FrontCounter BC.¹⁴⁶

By August 30, 2011, DFO and British Columbia had jointly developed a draft application form for Pacific Marine Finfish Aquaculture. It sets out the information required from salmon farmers applying for a new site, including details about the site's location, the site's conformity with siting criteria (described below), and "intertidal and shallow subtidal habitat surveys" carried out by a "qualified professional."¹⁴⁷ The habitat surveys required with the application include a Juvenile Wild Salmon Beach Seine Survey, which "must be conducted along the entire nearshore area within the proposed tenure to obtain a quantitative assessment, including average mass and weight distribution profile (by species), of migrating smolts."¹⁴⁸ The draft application form also requires a Fish Health Management Plan (described in Chapter 9, Fish health management).¹⁴⁹

Mr. Thomson acknowledged during testimony that the question of whether a proposed farm is on a migration route for wild salmon does not appear on the application form.¹⁵⁰ Susan Farlinger, regional director general for DFO's Pacific Region, testified that the sockeye migration route "certainly is considered" in the siting of fish farms by "avoiding valued ecosystem components."¹⁵¹ I infer, based on the information quoted above, that for new applications some of this information might be obtained through the Juvenile Wild Salmon Beach Seine Survey, which a salmon farmer is required to submit along with an application for a new site – though depending on how the survey is designed (e.g., time of year and how far the seine net reaches from shore), the survey may not detect migrating salmon.

Screening by the Project Review Team

When FrontCounter BC receives an application for a new aquaculture site, the application is initially screened by the Project Review Team to determine whether the information requirements

are complete. The Project Review Team has historically included representation from the BC Ministry of Forestry, Lands and Natural Resources Operations (two positions); Transport Canada (one); DFO (one); and the BC Ministry of Environment (two). The aquaculture referrals officer under the Aquaculture Management Directorate fills DFO's position on the team. The Project Review Team takes up to 30 days to screen the application to "ensure proponents have provided adequate technical information for government agencies to effectively review the application package; and review and compare applications against approved siting criteria and evaluate whether all the required siting buffer information has been provided."¹⁵²

Siting criteria

The draft application form for Pacific Marine Finfish Aquaculture lists 16 siting criteria, adopted by the province and DFO after the Salmon Aquaculture Review (SAR) recommendations. The criteria, which require government reviewers to exercise professional judgment in evaluating proposals for siting new salmon farms, are as follows:

- At least 1 km in all directions from a First Nations reserve, unless consent is received from the First Nation (append consent letter).
- At least 1 km from the mouth of a salmonid-bearing stream determined as significant.
- At least 1 km from herring spawning areas designated as having "vital," "major" or "high" importance.
- At least 300 m from intertidal shellfish beds that are exposed to water flow from a finfish farm and which have regular or traditional use by First Nations, recreational, or commercial fisheries.
- At least 125 m from all other wild shellfish beds and commercial shellfish growing operations.
- An appropriate distance from the areas of "sensitive fish habitat" as determined by DFO.
- An appropriate distance from areas used extensively by marine mammals, as determined by DFO.
- At least 30 m from the edge of the approach channel to a small craft harbour, federal wharf or dock.
- At least 1 km from ecological reserves smaller than 1000 ha or approved proposals for ecological reserves smaller than 1000 ha.
- Not within a 1 km line of sight from existing federal, provincial or regional parks or marine protected areas (or approved proposals for these).
- Not infringing on the riparian rights of an upland owner, without consent, for the term of the tenure licence.
- Not in areas that would pre-empt important Aboriginal, commercial or recreational fisheries.
- Not in area of culture or heritage significance as determined in the *Heritage Conservation Act*.
- Consistent with approved local government bylaws for land use planning and zoning.
- At least 3 km from any existing finfish aquaculture site, or in accordance with local area plan or Coastal Zone Management Plan.
- Consistent with objectives contained in the applicable Integrated Management of Aquaculture Plan(s).¹⁵³

These criteria – with the exception of the last criterion, which must have been added recently to account for DFO's intended IMAPs – have been in place since March 2000 and "take the place of any previous farm siting criteria, including the Coastal Resource Interests Study guidelines and the Salmon Aquaculture Review's recommended salmon farm siting criteria (on which these criteria are based)."¹⁵⁴ The criteria provide DFO with considerable discretion to determine what are "significant" salmon-bearing streams, and what constitutes sensitive fish habitat.

Mr. Thomson said that the province consulted DFO about the criteria when they were initially developed.¹⁵⁵ Both Mr. Thomson and Mr. Last agreed that the siting criteria were developed by regulators using the best available science and following a precautionary approach. They also agreed that, because of the high cost associated with each application, industry applies for sites that have a greater probability of being approved by the regulators.¹⁵⁶ Providing an industry perspective,

Mr. Backman said the “siting criteria for salmon farms have been in a state of consistent and continual evolution” since the mid-1980s. He explained that the criteria are “scientific[ally] based and also precautionary when there hasn’t been adequate science done.”¹⁵⁷

Mr. Thomson emphasized that the siting criteria are not (and have not been) the only basis for decision making about licences – they are used only for the initial screening of sites. For example, as Mr. Thomson explained, before the *Morton* decision, DFO habitat biologists would conduct an environmental assessment, often under the CEAA.¹⁵⁸ Mr. Swerdfager said that the siting criteria are “as or more stringent” than those used in Nova Scotia, New Brunswick, Newfoundland, Scotland, Ireland, and Chile.¹⁵⁹

In contrast, Dr. Fleming, a professor at Memorial University, testified that the siting criteria strike him as “rather vague and unspecific” and that their scientific basis was not clear to him. In particular, Dr. Fleming said the criterion of situating a farm at least 1 km from the mouth of a salmon-bearing stream seemed “arbitrary given the migration paths of the fish, the interactions, the dispersal of diseases and pest, parasites, and the potential for escape interactions with other streams.”¹⁶⁰ Dr. Fleming contrasted the 1 km setback approach with a “zoning” approach used in Norway under which wild salmon stocks are protected through a system of National Salmon Rivers and National Salmon Fjords.¹⁶¹ The Norwegian Parliament established this system in 2003 so that no additional salmon farms would be established in the National Fjords. As of 2007, there were 29 National Salmon Fjords and 52 National Salmon Rivers, protecting about three-quarters of Norway’s wild salmon production.¹⁶²

Ms. Parker noted that the siting criteria in British Columbia protect every single salmon-bearing stream whereas Norway’s system protects only a limited number of rivers and fjords.¹⁶³ However, as Dr. Fleming pointed out, salmon migration in British Columbia is unique, with large numbers of smolts having to travel through the same confined inside passage (and past salmon farms) before reaching the open ocean.¹⁶⁴ Unlike Norway’s National Salmon Fjords, the 1 km setbacks protect only the areas directly around the mouths of *significant* salmon-bearing streams;

these setbacks do not protect fish along their entire migratory route toward the open ocean.

Dr. Laura Richards, regional director of DFO’s Science Branch, testified that she is not aware of any work by DFO Science looking at the cumulative impacts of salmon farms in a confined area, though she said the department does have “some tools that I think we would be able to use to start to look at some of those questions.” As an example, Dr. Richards said DFO has been investigating the water circulation in some of these areas and developing circulation models.¹⁶⁵

Mr. Thomson said that the department would seek to review the siting criteria given that they have been in place for a number of years.¹⁶⁶ No timeline was suggested for this review.

Past reviews and assessments of salmon farm sites

Both Mr. Last and Mr. Thomson testified that each of the federal and British Columbia governments has always held vetoes over siting decisions.¹⁶⁷ Mr. Last said that past licensing decisions were made on a case-by-case basis.¹⁶⁸

Mr. Last testified that, between 2000 and 2002, the provincial government reviewed the existing farm locations for environmental, economic, and social impacts and identified a total of 37 farms that needed to be relocated. Of those 37 farms, six were removed and the companies involved applied for new sites elsewhere; two were put back into the review process as new farm sites; and nine relocations were completed. The remaining farms had their operational strategies, management, or purpose adjusted such that the province believed the farms became suited to their locations.¹⁶⁹ There is no direct evidence before me that answers the question of whether Fraser River sockeye salmon migration routes were specifically considered during this relocation process. However, Exhibit 1615, a table summarizing actions that the province took to implement the Salmon Aquaculture Review’s recommendations, suggests that negative benthic effects were the key driver in these farm relocations.¹⁷⁰

Mr. Thomson said that the “storyline” of past assessments is complex and that not all salmon farms

have been assessed under the CEAA, partly because they existed before that Act. Some such farms were subsequently screened under the CEAA during the early 2000s, when navigable water permits were reissued. However, Mr. Thomson said that, because the responsibility for navigable water permits shifted from DFO to Transport Canada in 2005, he was not aware of the current status of CEAA assessments of salmon farms.¹⁷¹

During the Commission's hearings on habitat management, Rebecca Reid, former regional director of DFO's Oceans, Habitat and Enhancement Branch, indicated that past DFO habitat assessments of proposed salmon farm sites concentrated on benthic effects. She testified that, in relation to the renewal of 97 salmon farm sites in 2005, the department sent letters to Transport Canada. Transport Canada then conducted CEAA screenings of these sites when permits under the *Navigable Waters Protection Act* came up for renewal, advising that, if mitigation measures were employed, no HADDs would result from the sites.¹⁷² Ms. Reid indicated that this advice was based on information from DEPOMOD (depositional modelling), a model used to predict benthic effects from salmon farms.¹⁷³

DFO's letters to Transport Canada make no mention of sockeye migration routes or any assessment conducted by DFO of the potential for salmon farms to transfer diseases to wild salmon.¹⁷⁴ However, Mr. Swerdfager testified that DFO has considered disease issues in siting salmon farms. He said he was "very, very confident that quite a wide range of risks were considered when we made those siting decisions[.]" though it was unlikely the risks could be reduced to zero.¹⁷⁵

Ms. Farlinger described the screening process that DFO has carried out for new salmon farm sites since the mid-2000s. She explained that it involves, first, a "rough" initial screen that employs the siting criteria in a precautionary way to avoid harming "valued ecosystem components" and then, second, a more detailed look at site-specific habitat impacts such as the "circulation in the area and the deposit of organic material and the level of production." She

also said that these processes have been brought over into the new *Aquaculture Regulation*.¹⁷⁶

Kerra Hoyseth, senior aquaculture biologist in DFO's Aquaculture Environmental Operations, explained that in 2005 a procedure was put in place using DEPOMOD to set thresholds* for benthic effects from sites. If a site was predicted to exceed the threshold, DFO would consider that site to cause a HADD. Ms. Hoyseth said that threshold has been consistently applied since 2005, though the department did not go back and apply that threshold to sites assessed before 2005.¹⁷⁷

Mr. Thomson testified that, for those existing salmon farm sites which have undergone screening under the CEAA, the "heart of the assessment" was the Valued Ecosystem Components (VEC) table in which impacts and mitigation responses were listed.¹⁷⁸ In a presentation prepared by Mr. Thomson for the Special Committee on Sustainable Aquaculture in 2006, he described the VEC tables:

Valued Ecosystem Component (VEC) Tables

A Summarized report on potential effects such as:

- Water quality, fish habitat (e.g., benthic)
- Fisheries resources (e.g., lingcod, rockfish, anadromous)
- Biodiversity (species of concern)
- Human health, recreational /commercial fisheries
- Tourism

VEC table also identifies mitigation measures to minimise / avoid these effects:

- Determinations are made based on the overall potential for environment changes resulting from the *residual effects*. [Emphasis in original.]¹⁷⁹

Three CEAA screening reports for salmon farm sites are in evidence, two from the Discovery Islands (Read Island and Quadra Island), and one from Nootka Sound.¹⁸⁰ The VEC tables in all three of these reports include consideration of various issues that affect wild fish populations:

* I note on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 5, amends section 35 of the *Fisheries Act* to remove the prohibition on unauthorized HADDs. It replaces it with a prohibition on unauthorized activities that result in "serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery." It is not known how these changes will affect such standards as the threshold described by Ms. Hoyseth.

- the potential introduction and/or transmission of disease and/or parasites from farm fish to wild fish;
- the potential for escaped farm fish to interbreed with or compete with wild salmon;
- the potential for improper storage or disposal of fish mortalities on farms to cause disease transmission to wild fish; and
- the potential for blood water and other discharge associated with harvesting fish to cause water quality changes or to transfer disease to wild fish.¹⁸¹

In all three of these cases, the review found the risks to be either “low” or “negligible.” An example row from the VEC table from Transport Canada’s CEAA Screening Environmental Assessment Report for an amendment to Marine Harvest Canada’s Conville Bay salmon farm site is depicted in Table 1.8.1.

Table 1.8.2 shows a segment of the cumulative environmental effects analysis for the same salmon farm site.

Neither Mr. Swerdfager nor Mr. Last could identify any case in which an application for a salmon farm site was denied on account of the potential effects on Fraser River sockeye.¹⁸²

Future reviews and assessments of salmon farm sites

I heard evidence about DFO plans for assessing future salmon farm applications. DFO’s draft policy on “Identification and Management of Environmental Impacts of [sic] Under the British Columbia Aquaculture Regulatory Regime” states that, before issuing a licence for a new aquaculture site or making a substantial amendment to an existing licence, the department will consider several things:

- fish habitat: benthic habitat, water quality, algae, and primary production;
- fish resources: wild fish populations and population health, including finfish, marine mammals, sharks, and invertebrate populations;

- species at risk;
- ecosystem effects per departmental guidance;
- wild fishery activities; and
- First Nations use of land and resources for traditional purposes as well as other matters.¹⁸³

The department plans to employ the following tools to collect and analyze site-specific information to support its decision making:

- baseline environmental data that the licence holder or applicant is required to provide with the application;
- site impact modelling tools such as depositional modelling;
- assessment of mitigation measures to minimize risks of negative ecosystem effects;
- siting guidelines;
- cumulative effects assessment through consideration of IMAPs, Integrated Oceans Management processes, and IFMPs;
- First Nations and public input through the IMAPs and other federal or provincial consultations; and
- other assessments, such as ones conducted under the CEAA* triggered by NWPAs approvals, or provincial environmental assessments.¹⁸⁴

Ms. Farlinger testified that DFO’s new standards for site selection apply only to new site applications, though new monitoring provisions apply to all active farms, whether new or originally licensed under the provincial regime.¹⁸⁵

The IMAP process may also have an impact on the assessment of site applications. Mr. Thomson noted that IMAPs are intended to take an area management approach to aquaculture management.¹⁸⁶ “We’d like to move to a more ecosystem-based approach,” he explained, “as opposed to the site-by-site-based approach[.]”¹⁸⁷ Mr. Bevan testified that, as part of area-based management, conditions of licences will not be “cookie-cutter” and that management plans will be defined according to specific areas. “They will be reflective of the overall plan that must apply in the geographical area or the ecosystem

* I note that on June 29, 2012, Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent. Part 3, Division 1, enacts the *Canadian Environmental Assessment Act, 2012*. As a result, the references in this chapter to the CEAA may not reflect the current law respecting environmental assessment in Canada or the applicability of environmental assessments to salmon farms.

Table 1.8.1 Project components and activities and their potential direct environmental effects on Valued Ecosystem Components (VECs) or Valued Social Components (VSCs), associated mitigation measures, and significance of residual effects

VECs/VSCs	Project component or activity	Potential project-environment interaction	Mitigation measures	Significance of residual adverse effects
Fish resources: Wild fish populations	Introductions and transfers of fish onto the farm site	Potential introduction and/or transmission of disease and/or parasites from farm fish could impact wild fish populations.	Under the Atlantic Salmon Importation Policy, Atlantic salmon smolts cannot be imported from overseas; only fertilized eggs or milt from certified sources are allowed into the country. Imports are limited, held in quarantine, and closely examined before introduction to farms. Species being imported from outside Canada for culture must be certified disease free therefore no impacts are expected. Fish transferred under Section 56 of the Fishery (General) Regulation must not have any disease or disease agent that may be harmful to the protection and conservation of fish. The proponent will adhere to standard introduction and transfer policies. In addition, the existing Fish Health Protection Regulations requires that any facility serving as a source of salmon must undergo rigorous health testing before fish can be provided to culture operations. In addition, a Fish Health Management Plan is required to address issues of fish health for farmed fish and takes into account interactions with wild fish. This Fish Health Management Plan also requires a mandatory sea lice monitoring program to further minimize risks to wild fish populations. The Fish Health Management Plan will be reviewed on an annual basis and will be updated as necessary in conjunction with an adaptive management approach. BCMAFF will conduct audits of sites on a random basis and take compliance enforcement actions where necessary. Site, vessel and visitor-related fish-health protocols (including use of foot baths, disinfection of any equipment used with fish or sediment monitoring) are in place. This is in accordance with the industry-wide protocols in BC.	Low

Source: Reproduced from Exhibit 1630, p. 9.

Table 1.8.2 Cumulative environmental effects analysis of the significance of residual effects on Valued Ecosystem Components and Valued Social Components

Valued Ecosystem or Social Component	Residual Effects (After Mitigation) & Significance of these Effects	Other Activities/Projects Contributing to Cumulative Effects	Comments	Significance of Cumulative Effects
Fish resources: wild fish populations	Potential intermittent introduction and/or transmission of disease and/or parasites from farm fish to wild fish populations	Similar potential effects may occur within 0.8 to 3.8 km of the Conville Bay site (Hoskyn Channel), at 3 Marine Harvest sites (Bear Bay, Conville Point and Dunsterville Bay). At a greater distance, 12.2 to 27 km, similar effects would occur in Okisollo Channel at 1 Marine Harvest site (Cyrus Rocks), 1 SKM site, operated by Heritage Salmon Ltd. (Barnes Bay), 1 Pan Fish site (Sonora Island), and 2 Heritage Salmon Ltd. sites (Brent Island and Venture Point – Sonora Island).	Pathogens that originate in salmon farms at renewal sites in Hoskyn and Okisollo Channels are not likely to have significant cumulative adverse effects on migratory salmonids. Uncertainty exists with respect to the migratory patterns of salmonids along the channels/inlets in the area, and on effects associated with groups of salmonids migrating past multiple farm sites a short distance apart (potential IHN reservoir locations). Measures outlined in the companies Fish Health Management Plans reduce likelihood of transmission and effects on wild fish populations. Most existing sites in the area are managed by two companies, which further reduces pathogen transmission risks by enabling area-wide fish-health management protocols. Two sites (Conville Bay and Conville Point) are less than 1km apart.	Low

Source: Reproduced from Exhibit 1630, pp. 16–17.

that is being used by all of the farms in that location,” he stated. The concentration or density of farms could influence the licence conditions that would apply in those areas.¹⁸⁸

Salmon farms on the Fraser River sockeye migration route

I heard testimony from a number of witnesses who provided their perspectives on whether salmon farms located on the Fraser River sockeye migration route pose a risk to wild sockeye. The evidence on risks is discussed further in Volume 2 of this Report.

On one side is the evidence of anti-salmon-farming activists and scientific researchers concerned, primarily, about pathogen or disease transfer from farmed to migrating wild sockeye. The concern results from salmon farms breaking the natural pattern of “migratory allopatry.” Dr. Lawrence Dill, biology professor at Simon Fraser University and author of Technical Report 5D, *Dill Salmon Farms Investigation*, described migratory allopatry as the migratory pattern of sockeye in which the return migration of adult fish occurs at a different time from the outgoing smolt migration. Consequently, the adults and juveniles do not cross paths in the water, thereby limiting the opportunity for disease transfer from adult to juvenile fish. Fish farms “close the loop” by providing a reservoir of adult hosts that interact with juvenile salmon during the outmigration in the spring.¹⁸⁹

According to Alexandra Morton, executive director of Raincoast Research Society, in 1992, salmon farms were sited on the Fraser River sockeye migration route, and, since then, most Fraser River sockeye stocks have been in decline but certain stocks, such as Harrison River sockeye, have been doing very well. Ms. Morton suggested that the Harrison River sockeye are doing well for two reasons: (1) they leave the river when they are very small, so they are not exposed to adult returning sockeye who have swum past fish farms; and (2) they do not themselves swim by fish farms.¹⁹⁰

With reference to Norway’s National Salmon Fjords, Dr. Fleming said that, if Fraser River sockeye have to pass through narrow passages, and if the stocks are recognized as significant, and if there is a significant effect of disease and parasites

on those fish passing through an area such as the Discovery Islands, then it would be helpful to zone such areas in a similar fashion to Norway’s protected fjords to avoid disease transmission from farmed to wild fish.¹⁹¹

Indeed, the Living Oceans Society has proposed exactly that. Ms. Stewart testified that the Living Oceans Society identified nine farms in the Discovery Islands, all located on a migration route that the group dubbed the “Wild Salmon Narrows,” and “prioritized those farms in order to try to clear one migratory route through the Discovery Islands for wild salmon.”¹⁹² Figure 1.8.5, a map prepared by Living Oceans Society, identifies these farms. Six of the nine farms shown are Marine Harvest farms.¹⁹³ Ms. Morton said these narrow passages are of more concern than other farm sites because there will be a higher density of “viral particles, or parasite eggs, or juveniles” in a smaller body of water than in a larger one, where the dispersion rate would be greater.¹⁹⁴ Dr. Michael Kent, the author of Technical Report 1, *Infectious Diseases*, confirmed that sockeye salmon swimming past a net pen filled with millions of Atlantic salmon do face an “increased potential” for transmission of diseases to them compared with sockeye swimming through water with no other salmonids.¹⁹⁵

On the other side is the evidence of salmon farmers and government regulators who say the risks are low and mitigation measures are sufficient. Ms. Dansereau did not agree with a general statement that it makes sense to avoid wild salmon migratory routes. “We don’t function from general statements,” she said. “So we would have to investigate and continue to investigate to see whether or not there was a reason to do that.”¹⁹⁶

In response to Ms. Morton’s comparison of Harrison River sockeye to other Fraser River stocks, Mr. Backman said that “there are several salmon farms operating in Puget Sound and there are Chinook salmon farms operating on the West coast of Vancouver Island,” implying that Harrison River sockeye may be exposed to these farms, such that a lack of exposure to fish farms does not account for the difference.¹⁹⁷

Further, as described in Volume 2, Dr. Gary Marty, fish pathologist at BC’s Animal Health Centre, Dr. Mark Sheppard, lead veterinarian in DFO’s Aquaculture Environmental Operations, Dr. Peter McKenzie, veterinarian and fish health manager for Mainstream Canada, and Mr. Swerdfager all



Figure 1.8.5 Salmon farms in the Wild Salmon Narrows

Source: Exhibit 1563.

agreed that “the risk of disease in salmon farms is manageable with appropriate care and attention.”¹⁹⁸ Dr. Sheppard said “the risk can never be zero,” but managers minimize as best they can the risks to wild fish.¹⁹⁹ Similarly, Mr. Swerdfager said the regulatory framework in place does not reduce the risk to zero, but “it substantially reduces it.”²⁰⁰

Neither government nor industry witnesses were entirely opposed to some experimental

removal of salmon farms from critical migratory routes. For example, Ms. Dansereau testified that she was willing to consider adding, as a condition of the licence, a requirement that salmon farms participate in the experimental removal, following, or relocation of salmon farms currently located along the migratory route.²⁰¹ As well, Mr. Last agreed that a zoning mechanism might be helpful and that, if there is a risk to wild salmon from migrating

past fish farms, then the risk would be greater in narrow channels.²⁰² Dr. Stewart Johnson, head of the Aquatic Animal Health Section, DFO, said that *if* Fraser River sockeye are exposed to pathogens from salmon farms, then moving salmon farms off their migratory route is something that could be done to limit sockeye's exposure to pathogens.²⁰³

Some evidence suggests that some salmon farmers might like to move their farms closer to the open ocean to reduce the potential for environmental impacts and controversy.²⁰⁴ Indeed, in final submissions the BCSFA sought the following recommendation from me:

[T]hat DFO provide support for quick access to ocean tenures from Cape Caution to Prince Rupert to allow site relocation for environmental sustainability to continue. As suggested in Exhibit 1942, the industry is interested in moving those sites identified by Mr. Last that were not relocated when the moratorium was lifted, whose operations have been limited in order to remain compliant with environmental performance requirements, closer to the open sea to reduce the potential for environmental impacts and controversy.²⁰⁵

Ms. Parker, however, noted in her testimony that the entire BC coast could potentially be considered a migration route for one salmon species or another.²⁰⁶

■ Monitoring of and compliance by salmon farms

Responsibility for compliance activities in relation to fish farms is shared between C&P and AMD. DFO is implementing a system of industry self-reporting coupled with government audits that builds on both the previous provincial Fish Health Audit and Surveillance Program (described below, and in more detail in Chapter 9, Fish health management) and previous DFO experience in evaluating the effects of salmon farms on fish habitat (described below, and above in the discussion on siting and licensing of salmon farms). This

self-reporting regime mirrors the approach taken by DFO on other fish habitat issues (see Chapter 6, Habitat management).

In this section of the chapter, I review the evidence related to compliance activities at salmon farms and describe monitoring, reporting, and auditing under the federal conditions of licence. Because some elements of the current federal program are modelled on the previous provincial program, and given the recent change in regulatory regime, I begin with a brief description of monitoring and compliance activities under the former provincial regulatory regime for salmon farms.

The former provincial regime

As the lead regulator of salmon farm operations until December 18, 2010, the province monitored compliance with its aquaculture regulations through a system of industry self-reporting and government inspections and audits.

Inspections of active farms occurred at least annually, conducted by either BCMAL's aquaculture inspectors or MOE's conservation officers. (See description of conservation officers in Chapter 7, Enforcement.) Inspections proceeded according to a 2002 Service Agreement on Coordination of Compliance and Enforcement Programs. Under that agreement, BCMAL (or its predecessors / successors) had the lead role in compliance activities, and MOE (or its predecessors / successors) had the lead role in enforcement activities.* The agencies agreed to conduct "joint environmental monitoring activities on site in order to achieve harmonization between compliance inspections and on-site activities."²⁰⁷ Inspections were also carried out according to a biosecurity protocol between the province and industry, under which inspectors provided farms with 48 hours' notice before an inspection and sought input from the farms on the order of farm visits.²⁰⁸

BCMAL and MOE used the data collected during inspections to prepare annual reports on industry compliance. The 2009 report stated that the agencies found generally high levels of compliance for both BCMAL requirements (93–100 percent, with an

* Note that, owing to ministry reorganizations and name changes, the ministries named in the service agreement are different from those stated here. See discussion of provincial ministries above in the regulatory roles and management programs section.

average of 99.4 percent) and MOE requirements (97–100 percent, with an average of 99.6 percent).²⁰⁹

In addition to inspections, a number of regulations required salmon farmers to self-monitor and report information to regulators. Regulatory requirements included the following:

- conducting environmental monitoring for benthic effects and reporting the data to regulators;²¹⁰
- reporting (by January 31 each year) the total dry weight and type of feed (including additives) used in the past year;²¹¹
- reporting information about release of materials into the water (such as therapeutants) and fish health (such as mortality numbers), annually by March 31;²¹² and
- reporting fish escapes from farms within 24 hours of discovery.²¹³

In the early 2000s, the province implemented a Salmon Health Management Program (also called the Fish Health Audit and Surveillance Program), composed of “on-farm health management plans, mandatory monitoring and reporting of disease events, and a BCMAL audit of industry-reported information[.]”²¹⁴ Salmon farms were required to report “site-specific information” to the BCSFA industry database monthly and include all mortality, causes of mortality, and fish health events (FHEs).^{*} The BCSFA then submitted quarterly reports of these data to BCMAL. BCMAL posted quarterly reports about these data as well as its annual Fish Health reports on the Animal Health Branch’s public website.²¹⁵ The province published aggregate data (three or more companies combined) for some information provided to them by the BCSFA.²¹⁶ In addition to the Fish Health Audit and Surveillance Program, BCMAL also required fish farms to conduct sea lice assessments on active Atlantic salmon farms “on a monthly basis and report that monthly data (in an aggregated form) from each sub-zone.”²¹⁷ (Monitoring of fish health under the provincial regulatory regime is discussed further in Chapter 9, Fish health management.)

Current federal roles and responsibilities

Since December 2010, DFO has been the lead agency for monitoring and compliance activities in relation to salmon farms. These responsibilities are shared between C&P and AMD staff. Mr. Thomson testified that DFO split the role between C&P and AMD’s Aquaculture Environmental Operations (AEO) because assessing some requirements in the conditions of licence demands specific skill sets or specific technical training:

That’s why we have two veterinarians employed, we have fish health biologists, fish health technicians who conduct some of these audits and inspections ... [O]ne of the big pieces of expertise that the C&P officers have, of course, over anything that we have is the ability and expertise around conducting investigations.²¹⁸

In June 2011, C&P and AMD in DFO’s Pacific Region finalized a British Columbia Aquaculture Compliance and Enforcement Strategy 2011/2012. This strategy “aims to create a consistent, strategic, risk-based and integrated approach that will promote, assist and compel compliance with the [PAR] and related policies.”²¹⁹ It is one of a suite of documents to guide compliance and enforcement activities as set out in Figure 1.8.6.

The strategy sets out the following (among other things):

- It will adhere to the National Compliance Framework. [See Chapter 7, Enforcement.]
- Its objectives are to focus on “identifying compliance problems and establishing baseline compliance information” by the end of 2011, and “to focus effort on education and compliance promotion of PAR and the *Fisheries Act*, to increase the aquaculture industry’s awareness of their regulatory obligations and their role in ensuring the protection of the environment in which they operate.”

* Exhibit 1560, p. 5. For the purpose of industry database reporting, a FHE “is defined as an active disease occurrence or a suspected infectious event on a farm that triggers: 1) veterinary involvement and 2) an action, such as: lab diagnosis, recommendations / report, husbandry change, prescription medication, further investigation, etc. where such action is intended to reduce or mitigate risk associated with that event.”

- Its priorities for compliance and enforcement actions “will be informed by performance of the licence holders as laid out in the performance management strategy, potential risks, impacts of aquaculture activities, and the sensitivity of fish and fish habitat.”
- C&P and AMD will develop annual operational plans.
- C&P and AMD will “manage compliance risks by implementing an integrated risk management process into decision-making and operational planning.”
- “The department will develop an integrated aquaculture compliance risk assessment in 2011/2012.”
- C&P staff will be trained about the regulatory requirements of PAR, and AMD staff will be trained to carry out

their powers as Fishery Guardians and Inspectors.

- C&P and AMD will jointly work on information management and reporting goals.²²⁰

AMD and C&P have also developed a draft (as of the time of the hearings on aquaculture in August and September 2011), entitled “2011–2013 British Columbia Aquaculture Compliance Protocol”²²¹ (the Aquaculture Compliance Protocol). The purpose of the Aquaculture Compliance Protocol is to facilitate collaboration between the two programs and “to define the scope, principles, roles, responsibilities, accountabilities, governance, reporting requirements and terms in implementing an aquaculture compliance decision-making process” and to provide “proper management and control of fisheries and the conservation and protection of fish through

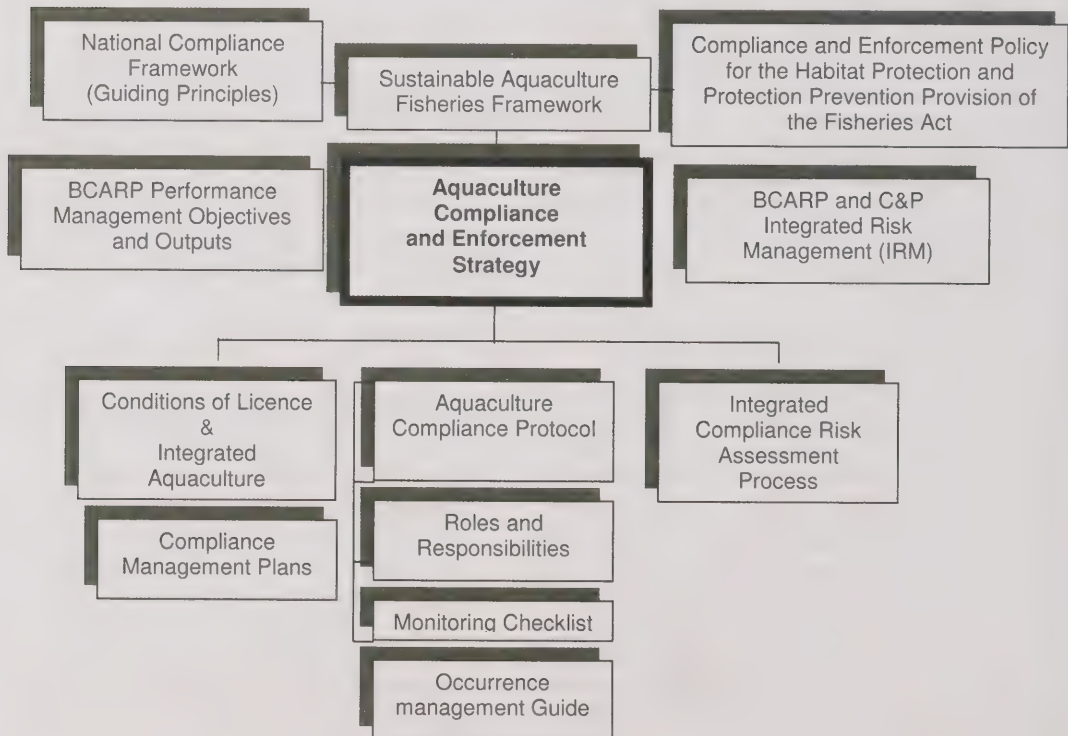


Figure 1.8.6 Relationship of Aquaculture Compliance and Enforcement Strategy to other documents

Source: Reproduced from Policy and Practice Report 20, Aquaculture, p. 93.

delivery of an integrated coherent and adaptive aquaculture compliance program, informed by risk.”²²² The Aquaculture Compliance Protocol sets out the roles and responsibilities of AMD and C&P concerning aquaculture in the region, stating such things as which organization will be the lead and which will provide support in relation to different deliverables of the program. The deliverables relate to strategic planning, industry engagement and compliance promotion, compliance monitoring, audits and effectiveness monitoring, occurrence screening, responding to non-compliance, information management and reporting, and training and designations.

The Aquaculture Compliance Protocol identifies DFO’s plan to conduct compliance monitoring (under the lead of C&P) and audits and monitoring (under the lead of AMD).²²³

Industry self-reporting requirements

The 2010 generic federal conditions of licence for finfish aquaculture facilities impose a number of information-reporting requirements on licence holders, including monitoring, providing notices, regular reporting, and emergency reporting.²²⁴ Mr. Thomson testified that DFO based its reporting and auditing regime on the province’s, but that DFO made some aspects of reporting “more compulsory.”²²⁵ The breadth of reporting requirements is shown in Table 1.8.3. As discussed in the section below on consultation and public reporting of information, DFO does not release all of this information to the public immediately – some is released after a delay, and some (such as employee names or contact information) is kept confidential.

Table 1.8.3 Summary of self-reporting requirements under the 2010 finfish aquaculture licence

Section of Licence	Line Item in Conditions of Licence requiring provision of plan or report
Front page	Licence Holder / Operating Party Name / Company Name
Front page	Contact Info. (e.g., employee name, phone numbers)
Front page	Site location / Description
Front page	Species
Front page	Maximum Allowable Peak Biomass
Front page	Substrate type
2.2	Report of inventory and stocking plan for calendar year (monthly volume and numbers of fish on site broken down by year class; stocking plan with source of fish; age / size at transfer; quantity; transfer period)
3.1	Containment Array Management Plan showing operational layout diagram indicating area of intensive use (cages, etc.) and extensive use (mooring lines, etc.) and noting tenure boundaries, location of cage array, other structures, anchor block location, nav. markings, nav. pathways, domestic water lines, storage and cleaning stations, bottom contours
3.2/3.3	Attestation by qualified professional that containment array designed to withstand prevailing conditions (initial; upon changes)
4.4	Transfer of Fish – Notification of intent to transfer fish, including origin location, destination location, quantity of fish being transferred, and confirmation of health of fish being transferred
9.1	Sea lice reporting for Atlantic salmon – Carrying out sea lice monitoring in program – Reporting requirements in Appendix VII, section 3: <ul style="list-style-type: none"> • Date of most recent sea louse treatment • Date of sampling • Capture methodology • Observations on lice grazing blemishes • Motile lice counted per fish per pen • Average motile lice per fish per pen, per site • Environmental parameters (monthly oxygen; water temperatures, salinity at 1, 5 and 10 m)
	Sea lice for farmed Pacific salmon – Observations of sea lice blemishes

Table 1.8.3 cont'd

Section of Licence	Line Item in Conditions of Licence requiring provision of plan or report
9.2	<p>Fish Health and Fish Mortality Event Reports (monthly)</p> <p>Part A: Reporting month and date, farm name / licence, contact name and phone</p> <p>Part B: Occurrence in month of</p> <ul style="list-style-type: none"> • Unusually high fish mortalities • Vet or Lab Diagnosis of Significance • Disease Outbreak (i.e., elevated losses) (id pathogen) • Cull Event (with explanation) <p>Part C: Individual incidents of note (may be more than 1)</p> <ul style="list-style-type: none"> • Date of Event • Number of Fish on Site (pieces) • Estimated mortalities (numbers, volume) • Note if an escape from lot during reporting period) • Note if harvest from lot during reporting period • Drug, Dates of Treatment (if applicable) • Treatment Information (withdrawal time prescribed, how applied to animals (in feed or bath), amount per kg of fee, etc.) / Response description • Prescribing Veterinarian • Person Responsible for Administering Treatment <p>Attester to Information</p>
10.1	Escape prevention measure reports (e.g., net maintenance)
10.3	Immediate notification of escape or suspected escape event
10.4	Follow up written report of the escape within 7 days
10.5	<p>Full written report of escape events</p> <ul style="list-style-type: none"> • Date, estimated time and location of event • Species of finfish involved • Estimated number of fish • Cause or suspected cause of the escape or suspected escape • Calendar year in which fish were stocked at facility • Rearing facility from which fish were received • Average weight • Current fish health records related to the fish that have escaped
10.6	Monthly report summarizing number of fish escapes or that cannot be accounted for based on inventory records
10.9	Report on results of recapture efforts, including estimated number of fish that escaped and number recaptured
11.4	<p>Incidental catch log of all fish that are caught within the net cages that are of a different species to those listed on the face of this licence, excluding biofouling, including:</p> <ul style="list-style-type: none"> • Species caught • Record of # released and number of mortalities; average weight
12.2	<p>Predator control measures in place, including:</p> <ul style="list-style-type: none"> • Predator nets (type / mesh size) • Whether predator nets have barrier above water line / distance • Whether predator nets and cages inspected by divers after predator interactions • Depth of predator nets in metres • Use and description of other non-lethal deterrents, including electric fences, shark guards, visual repellents, noise makers, other physical barriers, etc.
12.3/A.XIII	<p>Report of any Mammal accidental drowning mortality</p> <ul style="list-style-type: none"> • Date of discovery • Whether fish are on site; if no fish, indicate how long empty • Site biomass • Size of fish targeted <p>Species, number of animals, incident type and system component involved (e.g., containment net, predator net, shark guard, or other)</p> <p>Actions taken with carcass</p>

Section of Licence	Line Item in Conditions of Licence requiring provision of plan or report
12.6	Marine mammal kill reports (quarterly), including name of the facility and licence number; photographs of recaptured mammals with datestamp; number of harbour seals killed; number of California sea lions killed; date each seal / sea lion was killed; and date, species, number and cause of accidental drowning deaths
13.2	Biofouling Management Plan , including level of use of antifoulant treatments and other antifouling control mechanisms; number of nets treated by month; description of organic waste (type, size); frequency of net washing
13.7/A.XV	Benthic monitoring results at peak biomass , including: <ul style="list-style-type: none"> • Site plan with containment array (regular use and harvest / transfer) pens; location of video survey transects and/or sediment sampling stations • All raw results plus analysis
	Pre-stocking benthic reports where required (see 13.7)
13.20	Chemical and Other Substances Management Plan (Appendix VI) <ul style="list-style-type: none"> • Currently missing from draft COL
13.24	All spills shall be reported immediately
13.31	Feed and chemical release reports (annual) <ul style="list-style-type: none"> • Monthly total dry weight of feed, including weight of concentration of therapeutants; pigments; pesticides; and zinc and copper formulations • Names of all materials that are directly or indirectly released into the water during the reporting period, including anaesthetics, antifouling agents, and/or substances; • Monthly weight, in tonnes, of mortalities and disposal method; and • Monthly peak finfish biomass in tonnes
14.1	Immediate reports on mass fish mortalities equivalent to 4000 kg or more within a 24 hour period and/or an amount equivalent to 10,000 kg or more within a maximum 5 day period within 24 hours, including estimated weight in kilograms
16.1 (A.SVI)	Annual Aquaculture Statistical Report, including: <ul style="list-style-type: none"> • Product type, weight, \$ value, total food market sales • Processing info. • Sale of live fish or eggs for restocking • Stocking information • Stock on hand and future plans
17.1	Annual report on type of lights used, intensity, number and dates and times when lights are used (period of day; season)
18.3	Fish health treatment Declaration Form for Transfers / Harvest (covered for transfers in section 7.3) <ul style="list-style-type: none"> • Aquaculture number • Species of fish • Date of harvest • Name of processing plant to which fish are being delivered • Quantity of fish harvested • Lot number to identify the shipment of fish • Information on all treatments applied to fish within lot while at facility • Name of prescribing veterinarian, if applicable • Name of person responsible for administering treatment

Source: Reproduced from Policy and Practice Report 20, Aquaculture, pp. 176–78 (Appendix G).

Mr. Thomson explained that, as of early September 2011, DFO was still in the process of developing templates for industry to use to submit the information depicted in Table 1.8.3, and that this work was “part of the ongoing development of the information management system” (see discussion of data management, below). In the interim, salmon farmers are submitting reports to DFO in the best

formats they have available, which Mr. Thomson said has caused some difficulties with information management and flow within the department. He expected a “more full version of the information management system” to be ready between January and March of 2012.²²⁶

During the hearings on the marine environment, Dr. Jack Rensel, an expert on harmful algal

blooms (and other areas), testified that it would be useful for scientists to be able to access data from monitoring conducted by the salmon farmers on harmful algal blooms – something that is not currently part of the self-reporting requirements.²²⁷ Mr. Robin Brown, head of the Ocean Sciences Division, Science Branch, DFO, said that it would be useful to DFO Science to make it mandatory for salmon farmers to share their information on harmful algal blooms with DFO.²²⁸

One issue raised during the hearings is whether self-reporting regimes invite selective or incomplete reporting. More specifically, the concern is that information generated through self-monitoring may be biased in favour of the industry. In response to this concern, Mr. Thomson explained that “self-reporting is really a management tool that we use all across our fisheries management system” and that, wherever it is used, it is followed by an audit to verify the information being provided by the licensee.²²⁹ Ms. Parker said that industry self-reporting coupled with government audits is “appropriate, because then you get a two-tiered monitoring which allows both compliance efforts and also verification of whether or not mitigation measures are actually working.”²³⁰ (See also Chapter 6, Habitat management.)

Dr. Josh Korman, author of Technical Report 5A, Salmon Farms and Sockeye Information, who summarized the self-reporting data from the province’s self-monitoring regime, was of the view that both the quality and quantity of information coming out of the provincial monitoring program was “impressive,” though he said the data do not go back far enough in time to confidently assess questions before this Inquiry such as the impact of salmon farms on Fraser River sockeye (see Volume 2 of this Report).²³¹

Audits and monitoring

Under AMD, Aquaculture Environmental Operations (AEO) staff conduct paper reviews, or “desk audits,” of industry self-reported information (described above) and conduct audits and monitoring through site visits / inspections focused on

“fish health, benthic / environmental monitoring, and mitigation monitoring activities.”²³² Two AEO biologists stationed out of Port Hardy monitor marine mammal and Atlantic escapes.* Biologists working in Campbell River conduct environmental monitoring or benthic monitoring.† AEO’s fish health group, working under the lead veterinarian,‡ conducts sea lice and fish health monitoring, which are described in more detail in Chapter 9, Fish health management.²³³

Desk audits

Ms. Hoyseth described how AEO staff receive information from industry, review it, apply standards and protocols to it, and check companies for compliance with licence conditions. Ms. Hoyseth explained the feedback loop between industry and AEO staff monitoring for benthic effects:

At peak biomass ... the industry is required to do sediment monitoring, based on protocols we have provided to them in their licence. And for soft sediments ... they scoop mud or sediment from under the farm and they do chemical analysis to standards that we’ve provided to them. And for hard bottoms they do video monitoring. All that data is analyzed and reported to us.

... [Q]uite often that data is collected ... by a service provider, so a consultant, most often, who are R bios [registered biologists], so there’s sometimes a third party that does that monitoring. Sometimes that’s industry members. When that data comes to us ... we do a desk audit, we review it. And the thresholds basically are set so that if an impact occurs beyond what we would consider acceptable, the requirement is to fallow the site until those thresholds are reduced, or those impacts are reduced below certain thresholds.²³⁴

Ms. Hoyseth also said that if a farm goes beyond a threshold for harm, extra monitoring – in addition to a required fallow period – is necessary before the farm can go back into production.²³⁵

* As of July 2011, Byron Andres, senior biologist, and Erika Grebeldinger.

† As of July 2011, the senior biologist in this section was Kerra Hoyseth, who testified before the Commission.

‡ As of July 2011, Dr. Mark Sheppard, who testified before the Commission.

Site visits and inspections

AEO staff began visiting and inspecting fish farms under the Pacific Aquaculture Regulatory Program during the summer of 2011. Ms. Hoyseth said that in 2011 AEO staff had a target of visiting 25 percent of the active salmon farms to conduct benthic audits, but, as of the time of her testimony (September 1, 2011), staff expected to exceed their target and to visit 28 percent of the farms in 2011.²³⁶

Depending on the purpose of the inspection, sites are chosen for inspections randomly or by risk assessment. For example, sea lice and fish health monitoring, discussed further in Chapter 9, Fish health management, proceeds according to a random selection of sites within different fish health zones.²³⁷ Sites for benthic monitoring are chosen more strategically, based on considerations such as geography, peak biomass, the past history of the site, and any concerns expressed from external sources (such as tips through DFO's "observe, record, and report" line). Ms. Hoyseth explained that AEO tries to visit farms when they are at peak biomass because that is when the greatest environmental effects are expected. For efficiency, she explained, AEO normally plans its visits around a group of farms that are peaking at about the same time in the same area. However, AEO staff also purposely visit farms that they know have had past compliance issues.²³⁸

During a site visit, AEO staff complete a standard Marine Finfish Aquaculture AEO Inspection Checklist by doing a visual inspection and by speaking with the farm's site manager.²³⁹ The checklist covers the following topics (in summary):

- operational description and information such as the company name, date of inspection, species, biomass, and age of fish;
- site observations such as any non-licensed species observed at the farm, whether harvest or transfer pens were used, whether lights were used, and whether marine mammals were observed in the area;
- diagram and photos of the site; and
- information about active harvests / grade / transfer / mass mortality on site, active sea lice monitoring, and active fish health and fish mortality events.²⁴⁰

Ms. Hoyseth explained that some of the elements on the checklist, such as the section of the form that deals with mass mortalities, sea lice monitoring, and fish health events, are "opportunistic." AEO staff will complete these parts of the form only if such elements are occurring when they are on site.²⁴¹

Unlike habitat biologists working under OHEB (see discussion of C&P and habitat staff in Chapter 7, Enforcement), AEO biologists and veterinarians have fishery guardian and inspector status under the *Fisheries Act*.²⁴² This status enables them to write inspectors' directions under the *Fisheries Act*. When describing the general approach DFO took in designing aquaculture monitoring, compliance, and enforcement, Mr. Thomson testified that, after a "fairly extensive" review of the provincial approach, and considering the objectives of the department, the decision was to provide these additional powers to AEO staff so that they can better carry out the necessary monitoring for the conservation of fish and fish health. For example, "obtaining samples is something that we can compel versus having to ask [for]."²⁴³

AEO does not have to give notice to farms before a site visit. However, even with notice, the work the AEO group does on benthic impacts cannot generally be affected by any changes made at a salmon farm site. Ms. Hoyseth testified that AEO audit data are not compromised by notice of a visit, and sometimes there are benefits because the farms can alert AEO staff in advance of specific biosecurity procedures to be followed during the visit.²⁴⁴ (Biosecurity issues are discussed in Chapter 9, Fish health management.)

Compliance inspections

Fishery officers conduct compliance monitoring, which involves inspections of salmon farms for compliance with licence conditions. Brian Atagi, area chief of Aquaculture, C&P, said that, in 2011, C&P was visiting "as many sites as we can," and as of September 1, 2011, had visited 36 active sites. He would not commit to doing more compliance inspections than previously carried out by the province.²⁴⁵

Like AEO staff, fishery officers conduct their inspections according to a checklist. C&P has a draft Finfish Aquaculture Site Inspection Checklist, which Mr. Atagi described as a "living document

that's always evolving."²⁴⁶ Elements of the checklist are assessed by looking at "the site and their records and a portion of it is also gathered through actual observation and checking, say, like the net serial numbers, they're actually inspected by the officers."²⁴⁷ Elements on the draft checklist include the following:

- operational description and information such as company name, date of inspection, species, size of fish, and projected date of harvest;
- aquaculture licence information such as whether the licence is valid and produced on demand;
- questions about record keeping, planning, and procedures with respect to sea lice, fish health, escape prevention and reporting, incidental catch, predator control, fish mortality, light usage, and fish harvest;
- questions about boat operations such as whether vessels are operated in a manner to prevent damage to containment structures and whether there is adequate signage; and
- questions about escape prevention and cage and net integrity, including questions about inspections, record keeping, and net strength testing.²⁴⁸

If an occurrence is generated from the inspection (see description of occurrences in Chapter 7, Enforcement), the fishery officer assigns an occurrence number to the inspection.²⁴⁹

Mr. Atagi testified that, once the active season for inspections had passed, his team of fishery officers would have more time to work on developing standard operating procedures (SOPs) for "things such as escape response, marine mammal incidents and harvest inspection transfer."²⁵⁰

C&P does not have to give notice to companies before it visits a farm, but, according to Mr. Atagi, notice is usually given once C&P is in visual sight of the farm.²⁵¹ At the time of the hearings on salmon farms in August and September 2011, C&P officers had not been refused entry to a farm site.²⁵²

When either C&P or AEO staff visit a salmon farm site, they need to be aware of biosecurity issues to prevent the transfer of pathogens between farms or between wild and farmed fish.²⁵³ Mr. Atagi noted that biosecurity is a "complication to this fishery," and that not all the farms follow the same protocols.

For this reason, he said, C&P sent a letter to all salmon farms stating the procedures that it will use in inspecting a farm and inviting the farms to contact C&P if they had particular concerns about those procedures.²⁵⁴ Generally, biosecurity protocols include the principle that "you go from most sensitive or susceptible fish to less-susceptible fish, which helps protect them," and may set out procedures for cleaning equipment.²⁵⁵

At the time of the Commission's hearings on aquaculture, no compliance statistics were available for the industry under the federal regime; the program was too new. Mr. Atagi said the industry is in a learning phase with respect to the new conditions of licence. The sorts of compliance issues that fishery officers are seeing range from the "more administrative, some records are missing, all the way in regards to records that the licence isn't on site to issues of housekeeping such as lack of secondary containment for fuels or equipment that use fuels, that sort of thing."²⁵⁶

Data management

At the time of the Commission's hearings on salmon farms in August and September 2011, DFO was developing an Aquaculture Resource Information Management System (ARIMS) to house all data collected from salmon farmers under conditions of licence and through the monitoring, audits, and inspections conducted by AMD staff.²⁵⁷

C&P will separately track its work related to occurrences, inspections, investigations, and prosecutions through its Departmental Violation System (DVS), and it will track the time and effort of fishery officers on aquaculture files through its Fisheries Enforcement Activity Tracking System (FEATS).²⁵⁸ (DVS and FEATS are discussed in Chapter 7, Enforcement.)

■ Consultation and public reporting

In this section, I describe evidence I heard relating to DFO's consultation and engagement with parties other than the provincial government: industry, First Nations, and non-governmental organizations. I then turn to the issue of public reporting of salmon farm information.

Consultations leading up to the PAR

Mr. Thomson testified that DFO began consulting on the PAR in the spring of 2009. In particular, the department consulted with First Nations through the First Nations Fisheries Council (FNFC) (see description of the FNFC in the section on Aboriginal fishing in Chapter 5, Sockeye fishery management) and the Aboriginal Aquaculture Association (AAA). During the late summer or fall of 2010, DFO sent letters to individual First Nations seeking comments. It also attended some bilateral meetings with First Nations that requested meetings.²⁵⁹

Mr. Thomson said the “process we entered into with [the] First Nations Fisheries Council in gathering the information we did prior to the drafting of the regulation was ... probably a little bit ground-breaking in terms of it was really a great information source prior to regulatory drafting.”²⁶⁰ Mr. Swerdfager, however, testified that the FNFC made clear to DFO that “information sessions” did not, in the FNFC’s view, fulfill Canada’s duty to consult with First Nations on aquaculture decisions.²⁶¹ In 2010, DFO received a number of letters from individual First Nations concerning the proposed PAR.²⁶² One from the Sechelt Indian Band, dated August 24, 2010, serves as an example:

shíshálh Nation was not consulted and our concerns and interests were not accommodated by any of the existing Provincial licences for aquaculture within our Territory ... Please be advised that we expect to be consulted by Canada with respect to all aspects of your proposed steps for implementing the necessary regulations, policies and strategic plans related to aquaculture (and mariculture) within our Territory.

...

[Y]ou must ensure that shíshálh Nation has been consulted and accommodated with respect to all existing licensed sites within our Territory *before* taking steps to purport to legalize these unlawful tenures. [Emphasis in original.]²⁶³

Similarly, the Union of British Columbia Indian Chiefs wrote to then Minister Gail Shea on July 15, 2010, and again on August 26, 2010, expressing the

view that the “information sessions” held by DFO with the FNFC and AAA did not meet Canada’s consultation obligations with First Nations and questioning the validity of any licences issued under the PAR.²⁶⁴ Minister Shea responded in a letter dated October 20, 2010, noting that, after posting of the Regulation in the *Canada Gazette* on July 10, 2010, DFO met with members of the FNFC on July 14, 2010, and offered to meet with them again, but they declined. According to this letter, she also wrote to all BC First Nations offering to meet with any of them, 15 of which had sought meetings to that date.²⁶⁵

DFO also consulted industry and environmental groups on the proposed regulations.²⁶⁶ Ms. Dansereau testified that the department held “extensive consultation right around the province” while developing the regulations and the conditions of licence, including consultations with the province itself.²⁶⁷ Ms. Farlinger said there were a number of stages to the consultation. Informal consultations took place before the PAR appeared in *Canada Gazette* Part I. A formal consultation phase took place between the appearance of the PAR in *Canada Gazette* Part I and *Canada Gazette* Part II. That process is a specific national process which provides for citizen or group submissions. Then, after *Canada Gazette* II but before licences were issued under the PAR, DFO released draft conditions of licence for comment to the aquaculture industry, First Nations, and other interested groups, and made presentations about the draft conditions of licence to various groups.²⁶⁸

Consultation with the salmon-farming industry

The department works with the salmon-farming industry in various ways. Some arise from the relationship of regulator–regulatee, while others appear to stem from the department’s mandate to support the aquaculture sector (see discussion above on DFO’s mandate for aquaculture).

DFO’s relationship with industry developed well before the PAR. A briefing note to the director general of habitat management from 2005 shows the department meeting with industry representatives with a view to raising public confidence in aquaculture.²⁶⁹ Other evidence shows senior

people in the department meeting with industry. An example is a meeting in March 2010 between Marine Harvest Canada and the minister, at which the participants discussed the steps taken by the company to address sea lice impacts on wild stocks; the need for a new Aquaculture Act; and the pressure expected from environmental NGOs.²⁷⁰ (Ms. Dansereau and Mr. Bevan testified that the minister also meets with First Nations groups and the environmental community, and said there is nothing unusual about a government minister meeting a variety of individuals and stakeholders.²⁷¹) Similarly, in the process of developing the federal management framework for aquaculture, DFO met and consulted with industry representatives (and also with various environmental NGOs and others).²⁷² Moving forward, with respect to IMAPs, Mr. Backman said he expects “ongoing and continual stakeholder input and information-gathering” into salmon farm regulation.²⁷³

Consultation with First Nations

As described above, DFO witnesses said the department engaged in consultations with First Nations in the regulatory process leading to the development of the PAR.²⁷⁴

DFO does not have an established protocol for consultation with First Nations regarding aquaculture. At the time of the hearings on salmon farms in August and September 2011, the department was receiving legal advice on this matter, with a view to establishing a clear policy.²⁷⁵ One aspect of consultation is information-sharing; Mr. Thomson indicated that the specific information shared would depend on what a particular First Nation wanted to know.²⁷⁶

As stated by Mr. Thomson, the department promotes Aboriginal involvement in aquaculture. “[T]he department was very clear that one of its goals is to increase investment or increase participation by Aboriginal groups into aquaculture generally,” he explained. “And I think that that still remains a policy direction of the department[.]”²⁷⁷

Some First Nations participants in this Inquiry were critical of DFO. Their concerns

centred around how much consultation DFO had conducted with First Nations in developing the new aquaculture management framework and the PAR, as well as substantive concerns about that management and regulatory approach. In addition, some First Nations were critical of the department’s decision to “grandfather” existing licences (i.e., those previously issued by the province) when the department assumed jurisdiction over aquaculture.*

Various First Nations have sought greater engagement and involvement in the management of aquaculture. As an example, on September 25, 2009, the First Nations Summit passed a resolution which maintained that “BC First Nations must be actively involved in any legislative, policy and or decision-making process to reform the aquaculture industry in BC,” and said that “[t]he principles of reconciliation, respect and recognition of First Nations title and rights must be paramount in any legislative, policy or decision-making process regarding changes to the aquaculture industry.”²⁷⁸ Mr. Swerdfager from DFO indicated that some, although not all, First Nations saw the transfer to federal regulatory jurisdiction as presenting an opportunity to address their concerns about potential impacts on and infringements to First Nations’ constitutional rights.²⁷⁹ He expects the IMAP approach will address many issues advanced by First Nations concerning the size, location, and number of fish farms along the migration route of Fraser River sockeye.²⁸⁰

Consultation with non-governmental organizations and the general public

The department consulted with environmental groups and provided for input from the public on its proposed aquaculture regulations, which ultimately came into effect in late 2010.²⁸¹

Testifying in August 2011, Mr. Thomson indicated that DFO had “recently, from my office, sent letters out to First Nations, environmental organizations, provincial government and licence holders, describing [steps taken or being taken by

* For an elaboration of these concerns – both of substance and process – see Exhibits 1236, 1237, 1239, 1240, 1241, 1244, and 1656.

DFO on regulation of aquaculture] and describing our planned engagement strategy going forward in the fall[.]”²⁸²

Many scientists who testified before the Inquiry told me that they support or encourage more public involvement in both the scientific and management aspects of salmon farm regulation. For example, Dr. Stewart Johnson, and Dr. Craig Stephen, director and president of the Centre for Coastal Health and professor in the Faculty of Veterinary Medicine, University of Calgary, said they thought more involvement from the public and First Nations would be useful in defining socially and ecologically tolerable levels of risk of disease.²⁸³ Dr. Kristina Miller, head of the Molecular Genetics Section, Salmon and Freshwater Ecosystems Division, DFO, said she “certainly wouldn’t stand against” an oversight committee composed of the federal government, the provincial government, First Nations, stakeholders, environmental groups, all charged with reviewing the DFO scientific research agenda and setting priorities.²⁸⁴ Dr. Kyle Garver, research scientist, Aquatic Animal Health, DFO, said he would also support such a recommendation.²⁸⁵

Ms. Parker told me that current public consultation happens on an ad hoc, site-by-site basis, and that one of the advantages of the IMAP process may be a “more regular structured consultation” that is better able to capture impacts and “support broad-based area planning.”²⁸⁶

Ms. Stewart testified about some of the hopes and frustrations that NGOs have in consultations with government and in working with both industry and government on joint projects. She said one of the hopes her group had in entering dialogues with Marine Harvest (about sea lice monitoring in the Broughton Archipelago and a joint closed containment pilot project) was that joint discussions would end the battle over research methods. She also said she believes that “DFO could play a significant role in bringing the parties together to discuss methodology and purpose going into scientific studies and perhaps reach some conclusions coming out.”²⁸⁷ On the other hand, she noted frustrations such as when the Coastal Alliance for Aquaculture Reform raised \$5 million from the Moore Foundation earmarked for investment in closed containment technology in British Columbia (see discussion on closed containment technology in Chapter 9, Fish health management), contingent on matching government

funds, only to have the project die when the change in jurisdictional responsibility happened.²⁸⁸ She was also critical of DFO for bringing environmental NGOs into discussions only *after* DFO has worked with industry to design projects (such as with DFO’s project to secure organic certification for farmed fish), and for partnering with industry on projects (such as briefing fish retailers) without having environmental NGOs at the table, conducting joint briefings.²⁸⁹

Public reporting of salmon farm information

In this section, I use the term “public reporting” of information about salmon farms to refer *not* to the information that companies furnish to government regulators, but instead to describe the information the government makes available to the public (or requires operators to make available).

Those favouring the public release of data about fish farming articulate a number of reasons why this reporting should occur. Providing such information allows for transparency and accommodates interest – on the part of stakeholders and the public alike – in learning “what is going on” at salmon farms. Dr. Craig Orr, executive director of Watershed Watch Salmon Society, told me that scientists researching salmon farms and their interactions with resident species have long been concerned about the transparency of salmon-farming data in British Columbia for research purposes, and that “there’s far more transparency in Europe.”²⁹⁰ Documentary evidence makes this same point. In an email, David Lane of the T. Buck Suzuki Environmental Foundation referred Mr. Swerdfager to a paper from the University of Victoria Environmental Law Centre that compared transparency in the regulatory regimes of British Columbia, Norway, Ireland, and Scotland and suggested improvements for transparency in British Columbia. In response, Mr. Swerdfager forwarded the paper to his DFO colleagues, stating his agreement with it and that he thought “our planning is proceeding along these lines.”²⁹¹

On the other side of the ledger are concerns about making too much data public. Without adequate context or professional interpretation, such data may be misunderstood or misrepresented

in the public discourse about salmon farms.²⁹² Another concern is that an immediate and comprehensive flow of information about salmon farm operations could create difficulties for companies, if it meant the public had notice of some information before shareholders did.²⁹³

The approach to public reporting under development at the time of the Commission's hearings on salmon farms espouses a different approach to transparency of information than that taken under the previous provincial regulatory regime. As noted above, when the province oversaw salmon farms, it collected data under three main programs. The first was the Salmon Aquaculture Health Management Program, for fish health and medicated feed information. The second was the Aquaculture Inspection Program (dealing with fish-escape data). The third was the Aquaculture Statistics Program, which included harvest values and stocking activity data. (This last program provided the raw materials used to produce the regularly issued statistical report, the *B.C. Seafood Industry Year in Review*.²⁹⁴)

Although some of the data the province collected were made available to the public at large, other data were released in a limited or aggregated basis or not released at all. Thus, while the province publicly released information about licences – such as the name, location, and species of fish for a given farm – it would release only summary data, for three or more companies combined, for other types of information about aquaculture operations. This was the case for total medicated feed usage, total escapes, total harvest and “farmgate” value, total wholesale value, and number of licensed sites.²⁹⁵ As a second example, the provincial government collected data from its inspections and used these for an annual report on industry compliance, which was published on the Ministry of Agriculture and Land's website.²⁹⁶

The federal government, for its part, has signalled a move toward a more open flow of information to the public about BC salmon farm operations. As of August 2011, DFO had a draft policy entitled “Public Reporting of Regulatory Information Under the British Columbia Aquaculture Regulatory Regime.”²⁹⁷ That policy articulates the aim of transparency. It emphasizes that an important aspect of transparency for the public is having access to data on a number of fronts, including environmental monitoring, associated outcomes, and regulatory

compliance.²⁹⁸ The draft policy anticipates the public release of the following information:

- Regulatory information related to licences and licence holders, including licence holder reports, plans, and other submissions required as a condition of licence; DFO audit and investigation reports and compliance outcomes; and inspection and compliance statistics. Personal information is excluded, consistent with the federal *Privacy Act*.
- DFO policy and programs, including policies and operational guidance and protocols, conditions of licence, and IMAPs.
- Summaries of applications under review and decision information, including summaries of outcomes of environmental assessments undertaken for new licence applications and amendment applications.²⁹⁹

According to the draft policy, in some situations the federal government plans to delay the release of information, or mandate the form in which that information will be supplied:

- All information collected as a condition of operator licences will typically be released, but, where more practical or informative, data may be aggregated at the industry level.
- DFO intends to prepare an annual BC Aquaculture Regulatory Program report and may prepare complementary summary and analytical reports.
- DFO plans to have targeted timelines for the release of data:
 - within 20 business days for escape data;
 - on a quarterly basis, with a one-quarter lag time (90 business days) before posting information about new sites (such as location, species, and licence holder name; new marine finfish sites (such as maximum allowable peak biomass, substrate type, and containment array management plan); and marine finfish ongoing operations (such as sea lice counts, incidental catch, use of therapeutants, predator control measures, and reports on mass fish mortalities); and
 - at the end of a production cycle (for business confidentiality reasons) for marine finfish operations – for information such as

inventory and stocking plan and reports, fish health and fish mortality diagnoses, and population harvest declaration form.³⁰⁰

In testimony before me, DFO witnesses emphasized the department's commitment to transparency and the public reporting of much more information than was available under the provincial regime. Mr. Bevan testified that, while industry is responsible for following the conditions of licence (which include providing information to DFO), the department's role is to take that information and provide it through a transparent process to the public. Such transparency, he hoped, would show that the department is maintaining a sustainable activity.³⁰¹

Mr. Swerdfager commented on the principles behind the process adopted by DFO:

I think that one of the principles that guided the development of the Pacific Aquaculture Regulation was to substantially enhance the transparency of the aquaculture industry in British Columbia. So the way the regulation is set up and conditions of licence that flow from it has a very strong emphasis on the provision of information to the Department by the industry operators.

I think it's important to emphasize that these are terms and conditions that we are requiring. We are not going to have a discussion with farmers as to what we would like to get from them and how we would like to get it from them and so on. The discussion is very much one of "our modem is stuck on send." We're just telling people here's what you shall produce, and within reason, here's how you shall produce it. Obviously we'll have some discussion in terms of modalities around that, but we are compelling the production of certain information from farmers in a very, very detailed and rigorous way.

We intend to share the vast majority of that information. This policy document that is in draft sets out how we intend to do so. There are some nuances still to be made to it. There are some corrections and updates to it. But generally speaking, the thrust very clearly here is to take the information that we glean from finfish, shellfish and freshwater aquaculture operations in this province, to make it publicly available.

We set about building an information management system to allow us to do that effectively. We had made comments to the effect in public that we had hoped to have that system up and running in April or May. We have certainly been a little bit late on that, but much of that information is now up on the website. It went up last week. It will continue.

The only thing is that we are proposing – or intending, rather – to withhold are things that are very clearly of a private nature, individual's names, addresses, phone numbers. That stuff is often contained, for example, in licences, and we will not be disclosing that sort of information. But all the information that we get from the operation of the industry will be shared publicly, regularly. I can't tell you today it will be published on the second Wednesday of every month or something like that, we're not down to that stage, but it will be very regular and very easily accessible.³⁰²

DFO is at an early stage in its bid to bring transparency to salmon farming. Mr. Backman said that, although industry is supportive of being more transparent than in the past, meeting all the new reporting requirements has taken a lot of resources and "caused quite a bit of activity."³⁰³ Ms. Parker said she thought DFO has made "a fantastic start."³⁰⁴ She also said her understanding was that delays for data release built into the reporting policy are to ensure that companies are compliant with securities legislation.³⁰⁵ Ms. Stewart was more skeptical, saying her understanding for the delay was so that disease information would not "influence the marketability of the product. In other words, the farms don't want it going public if there are diseases, because they might have problems selling those fish"; thus, DFO is delaying release until after the fish have been marketed.³⁰⁶

By August 30, 2011, DFO had begun to publish monitoring activities and self-reported data on its public website. The department's reports included site-specific information about sea lice abundance counts; escapes; incidental catch; marine mammal "accidental drownings" and interactions; and aggregated numbers for authorized salmon egg importations (1985 onward).³⁰⁷ Fish health data other than sea lice data had not been posted as of that date. Data gathered for investigations by

C&P are not made public, although, in the event of a successful prosecution, a press release may be issued.³⁰⁸

It bears noting that hearings for this Commission were under way at the time of the “handover” to federal management, and indeed the Commission itself became involved in the question of what information should be available to the public, and what should not. In July 2010, two participant groups in this Inquiry – the Aquaculture Coalition and the Conservation Coalition – brought an application seeking documents relating to fish health, pathogens, and disease, as well as stocking data in farmed salmon, from Canada, British Columbia, and the BCSEA. I ultimately ruled that such data that exist for the period of January 1, 2000, to September 1, 2010, be produced to the Inquiry in respect of 120 fish farms.³⁰⁹ Although the province initially objected to some of this information becoming public exhibits, it withdrew that objection, and most if not all the information disclosed became exhibits during the hearings on aquaculture. As noted by Mr. Backman during his testimony, the public has never had access to the level of information on salmon farm fish health data that was made available during this Inquiry.³¹⁰

■ Findings

The period since February 2009 has been one of many changes in the regulation of salmon farms in British Columbia. Following the *Morton v. British Columbia (Agriculture and Lands)* decision, the Department of Fisheries and Oceans (DFO) has taken significant steps to establish a federal regulatory program for aquaculture in the province. The federal government committed A-based resources to the new Pacific Aquaculture Regulatory Program (PARP), and DFO has built on and improved on the existing infrastructure and programs developed by the province. Still, work remains to fully implement the PARP, such as the Integrated Management of Aquaculture Plans (IMAPs) process, as well as a fully functioning data management system.

On a broader level, DFO suffers from conflicting institutional mandates – on the one hand to regulate salmon farms for the conservation of wild salmon, and on the other hand to promote salmon farm development and products. The testimony of

the deputy minister to the effect that the minister of fisheries and oceans is not well placed to enforce section 36 of the Fisheries Act against salmon farms because of a conflict is telling and, in my view, is equally apparent in relation to section 35 (as that section applied at the time of her testimony). DFO faces conflicting roles in having to tell the world that Canada’s farmed salmon products do not threaten the sustainability of wild salmon, yet at the same time credibly examining the possibility that such products are not safe. DFO’s regulatory work – to site farms, to set conditions restricting farm growth, and to monitor farms and take enforcement actions against them – all suffer from this institutional conflict.

Spending under the Sustainable Aquaculture Program and its related programs raises further concerns that research on wild salmon is getting short shrift. This fact is particularly apparent when contrasting the 2010 allotment of \$300,000 under the program for Pacific Aquaculture Regulatory Research to five DFO scientists in the Pacific Region for short-term research to support policy and regulatory decision-making related to aquaculture, against the annual national spending under the Aquaculture Collaborative Research and Development Program (\$4.5 million) and the Aquaculture Innovation and Market Access Program (\$4.7 million) for research led by the aquaculture industry. Such extensive funding stands in sharp contrast to the limited resources that have been available for Wild Salmon Policy (WSP) implementation and other wild salmon research. The fact that DFO is not yet charging licence fees to salmon farmers adds to the perception of conflict.

In my view, the conflict between regulating and promoting salmon farms is not the same as the conflict that exists in regulating and promoting wild salmon fisheries. For wild salmon fisheries, DFO conducts its regulatory function to conserve and protect the same species and populations of wild fish whose sustainable harvest it is simultaneously promoting. The conflict between conservation and harvest may be managed within DFO because both the conservation mandate and the sustainable harvest mandate relate to the same wild fish: if you over-harvest, you cannot meet your conservation goals, which in turn jeopardizes your ability to harvest. Thus, both goals *should* be pursued simultaneously. Indeed, the conservation mandate

and the sustainable fisheries mandate, in relation to wild fish, *should* become one and the same. That same harmony in mandates cannot exist in relation to farmed salmon. For salmon farms, DFO's promotion or harvest mandate relates to farmed salmon, but its protection mandate relates to wild fish. Since the harvest of farmed salmon is not dependent on wild stocks, DFO could continue to promote the harvest of farmed salmon even if the wild salmon stocks suffered as a result and the wild fishery became unsustainable. In my view, this prospect makes these conflicting mandates unmanageable within a single department.

The WSP states that, although salmon farms pose risks (disease and parasite transfer, competition and genetic effects of escapees, and physical disturbances), those risks are addressed through mitigation measures, such as proper farm siting. However, the current siting criteria for salmon farms do not appear to require consideration of Fraser River sockeye migration routes. As well, the siting criteria have been in use for more than 15 years and, therefore, may not reflect the most recent scientific knowledge about the risks posed by salmon farms. It is time for those criteria to be updated to reflect the best available science, as well as input from First Nations and stakeholders affected by the siting of fish farms. The criteria that salmon farms not be located within 1 km of the mouth of a "salmonid-bearing stream determined as significant" has little relevance to the protection of Fraser River sockeye because there are no salmon farms sited within 1 km of the mouth of the Fraser River. If Fraser River sockeye are at risk from salmon farms along their migration route, it is the route itself that must be protected.

Despite assurances from DFO witnesses that sockeye migration routes have been considered in the siting of salmon farms, other evidence leaves me questioning the extent of that consideration. The state of environmental assessments of current salmon farm sites – with respect to whether they have been assessed and what was assessed – is not clear from the evidence before me, nor is it clear whether the effects of salmon farms on migrating Fraser River sockeye have been assessed in all cases. DFO's past assessments appear to have focused on benthic impacts rather than issues more likely to affect migrating Fraser River sockeye (such as disease

or pathogen transfer; see discussion of salmon farms in Volume 2). Although the three *Canadian Environmental Assessment Act* (CEAA) screening reports put into evidence did consider introduction of diseases and disease transfers from salmon farms, I also heard that not all farms may have been assessed under the CEAA. Further, DFO Science has done little or no research to assess the combined impacts of sockeye salmon migrating past several different salmon farms along their migratory route. DFO witnesses did tell me that, going forward, DFO intends to take an ecosystem approach and, under the IMAPs, evaluate salmon farm siting on an ecosystem rather than a site-by-site basis. This news is encouraging, and I hope it will bring sockeye migration routes to the forefront of considerations.

DFO has developed a model of industry self-reporting and government audits and inspections that mirrors its approach to monitoring of other habitat stressors. Some start-up work remains to be done to ensure that the system is operating as it should. For example, DFO needs to complete in a timely way templates for the industry to use in providing monitoring data; it needs to complete its information management system; and it needs to develop or complete standard operating procedures for its inspections, whether conducted by DFO's Aquaculture Environmental Operations or Conservation and Protection staff. I understand this work to be under way.

Neither salmon farms nor government auditors have, in the past, provided much data about salmon farms to non-government scientists; they have tended to treat this information as proprietary. DFO has made progress in making information from salmon farms more transparent and in reporting this information to the public. This work needs to be continued, particularly to provide access to non-government scientists for research purposes.

DFO has not yet assessed First Nations' potential claims of infringement due to salmon farms, and it has no clear policy or protocol on how to consult with First Nations on salmon farm issues. DFO may benefit from early discussion with First Nations, NGOs, and non-government scientists before making significant management decisions or undertaking significant scientific projects in relation to salmon farms. Discussions conducted contemporaneously with DFO's discussions with

industry may generate more buy-in to decisions or research conclusions.

I discuss these findings and any related recommendations in Volume 3 of this Report.

Notes

- 1 *Pacific Aquaculture Regulations*, SOR/2010-270, s. 1.
- 2 *Fisheries Act*, RSC 1985, c. F-14, s. 2.
- 3 PPR 20, pp. 8–9.
- 4 PPR 20, p. 11.
- 5 Exhibit 1366, p. 11; Exhibit 507, p. 3.
- 6 Exhibit 508, p. 2; Exhibit 507, p. 3.
- 7 Exhibit 1366, p. 8.
- 8 Exhibit 1977, pp. 5–6.
- 9 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136; and *Morton v. British Columbia (Agriculture and Lands)*, 2010 BCSC 100.
- 10 PPR 20, pp. 13–14.
- 11 *Fisheries Act*, RSBC 1996, c. 149; *Aquaculture Regulation*, BC Reg. 78/2002.
- 12 PPR 20, pp. 14–15.
- 13 Exhibit 1615.
- 14 Exhibit 1615, p. 1.
- 15 Transcript, August 30, 2011, pp. 50–51.
- 16 PPR 20, pp. 15, 17.
- 17 Transcript, August 30, 2011, pp. 48–49.
- 18 Exhibit 1622.
- 19 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002.
- 20 PPR 20, pp. 16–17. See generally Exhibit 1615.
- 21 PPR 20, p. 18.
- 22 Exhibit 8, p. 31.
- 23 Exhibit 8, p. 31.
- 24 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136.
- 25 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136, 200.
- 26 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136, 167, 201–2.
- 27 *Morton v. British Columbia (Agriculture and Lands)*, 2009 BCSC 136, 200.
- 28 *Morton v. British Columbia (Agriculture and Lands)*, 2010 BCSC 100, 34.
- 29 Exhibit 1640, pp. 3–4.
- 30 Exhibit 1703, p. 2.
- 31 *Pacific Aquaculture Regulations*, SOR/2010-270, s. 2.
- 32 PPR 20, p. 24.
- 33 PPR 20, pp. 24–26.
- 34 Andrew Thomson, Transcript, August 30, 2011, pp. 14, 23–24.
- 35 PPR 20, pp. 26–27.
- 36 PPR 20, p. 27.
- 37 PPR 20, p. 27.
- 38 *Environmental Management Act*, SBC 2003, c. 53.
- 39 PPR 20, p. 28.
- 40 Exhibit 1588, p. 14.
- 41 PPR 20, p. 46.
- 42 Exhibit 1583
- 43 PPR 20, pp. 47–48; Exhibit 1584; Exhibit 1585.
- 44 Exhibit 1581.
- 45 PPR 20, p. 48; Exhibit 1581; Andrew Thomson, Transcript, September 1, 2011, pp. 3–4.
- 46 PPR 20, p. 49.
- 47 Brian Atagi, Transcript, September 1, 2011, p. 17.
- 48 PPR 20, pp. 52–55.
- 49 *Canadian Environmental Assessment Act*, SC 1992, c. 37.
- 50 *Health of Animals Act*, SC 1990, c. 21.
- 51 *Feeds Act*, RSC 1985, c. F-9.
- 52 *Canadian Environmental Protection Act*, 1999, SC 1999, c. 33.
- 53 Exhibit 1728, p. 1.
- 54 Exhibit 1728.
- 55 Transcript, August 30, 2011, p. 83.
- 56 Trevor Swerdfager, Transcript, August 30, 2011, p. 42.
- 57 Exhibit 1608, p. 1.
- 58 PPR 20, p. 99.
- 59 Transcript, August 30, 2011, p. 42. See also Exhibit 1608.
- 60 PPR 20, pp. 99–100.
- 61 Exhibit 1609, p. 1.
- 62 Exhibit 1777, p. 1; Exhibit 1609, p. 1.
- 63 Exhibit 1731.
- 64 Exhibit 1937, p. 5.
- 65 Exhibit 1729, p. 1.
- 66 DFO website: <http://www.dfo-mpo.gc.ca/aquaculture/sustainable-durable/index-eng.htm>.
- 67 Andrew Thomson, Transcript, September 1, 2011, p. 5.
- 68 Exhibit 1588, pp. 5, 14.
- 69 Transcript, August 30, 2011, p. 14. See also Exhibits 1598, 1599, and 1600.
- 70 Andrew Thomson, Transcript, August 30, 2011, p. 14. See also PPR 20, p. 175 (Appendix F).
- 71 Exhibit 1598.
- 72 Exhibit 1599.
- 73 Exhibit 1600.
- 74 Exhibit 1601.
- 75 Exhibit 1602.
- 76 Exhibit 1603.
- 77 Exhibit 1604.
- 78 Exhibit 1605.
- 79 Exhibit 1610.
- 80 Exhibit 1611.
- 81 Exhibit 1612.
- 82 Exhibit 1576.
- 83 Exhibit 1613.
- 84 Exhibit 1614.
- 85 Transcript, August 30, 2011, pp. 14–15. DFO released a “draft for discussion” interim Integrated Management of Aquaculture Plan for marine finfish on October 21, 2011. See DFO website: <http://www.pac.dfo-mpo.gc.ca/consultation/aquaculture/index-eng.htm>.
- 86 Exhibit 1604, pp. 1–2.
- 87 Exhibit 1602; Susan Farlinger, Transcript, September 22, 2011, p. 80.
- 88 Exhibit 1602, p. 1.
- 89 Transcript, August 31, 2011, pp. 112–13.
- 90 Transcript, August 30, 2011, p. 15.
- 91 PPR 20, p. 90.
- 92 PPR 20, p. 90.
- 93 *Pacific Aquaculture Regulations*, SOR/2010-270, ss. 4(h), 4(o)(viii).
- 94 Exhibit 1594, pp. 12–13.
- 95 Exhibit 1626, pp. 1, 7.
- 96 Exhibit 1626, p. 2.
- 97 Transcript, August 30, 2011, p. 65. See also Exhibit 1627.
- 98 Transcript, September 26, 2011, pp. 47, 54–55.
- 99 David Bevan, Transcript, September 26, 2011, pp. 49–50; Claire Dansereau, Transcript, September 26, 2011, p. 46.
- 100 Transcript, September 7, 2011, p. 7.

- 101 Transcript, September 7, 2011, p. 8. See also Transcript, September 8, 2011, p. 23.
- 102 Transcript, September 7, 2011, p. 18.
- 103 Transcript, August 30, 2011, pp. 9–11.
- 104 Transcript, September 23, 2011, pp. 2–3.
- 105 See Exhibits 1634 and 1836.
- 106 Transcript, August 30, 2011, p. 81.
- 107 Transcript, August 30, 2011, p. 80.
- 108 Claire Dansereau, Transcript, September 28, 2011, pp. 36–37.
- 109 Transcript, August 30, 2011, p. 12.
- 110 Transcript, August 30, 2011, pp. 12–13.
- 111 Transcript, September 7, 2011, p. 11.
- 112 Transcript, September 7, 2011, p. 11.
- 113 Exhibit 216.
- 114 Exhibit 216, p. 4.
- 115 Exhibit 1833.
- 116 Transcript, September 8, 2011, pp. 23–25.
- 117 Gregory McDade, Transcript, September 26, 2011, p. 80.
- 118 Exhibit 1937, p. 2.
- 119 Transcript, September 26, 2011, p. 80.
- 120 Transcript, September 6, 2011, p. 86.
- 121 Transcript, September 6, 2011, p. 16.
- 122 PPR 20, p. 115.
- 123 Transcript, September 7, 2011, pp. 48–50.
- 124 Transcript, September 7, 2011, p. 51.
- 125 PPR 20, pp. 42–43.
- 126 Exhibit 1594; Andrew Thomson, Transcript, August 30, 2011, pp. 23–24.
- 127 Transcript, September 27, 2011, p. 7. See also Transcript, September 28, 2011, p. 38.
- 128 Transcript, September 22, 2011, pp. 77–78.
- 129 Transcript, September 28, 2011, p. 40.
- 130 Transcript, August 30, 2011, p. 25.
- 131 *Fisheries Act*, RSC 1986, s. 7(2).
- 132 Transcript, August 30, 2011, p. 25.
- 133 Transcript, August 31, 2011, p. 111.
- 134 Transcript, September 8, 2011, p. 97.
- 135 Transcript, September 1, 2011, p. 86.
- 136 Transcript, September 23, 2011, pp. 1–2.
- 137 Transcript, September 8, 2011, pp. 16–17.
- 138 Exhibit 1600, p. 2.
- 139 Transcript, August 30, 2011, p. 30.
- 140 Exhibit 1588, p. 6.
- 141 PPR 20, pp. 68–69.
- 142 Transcript, August 30, 2011, p. 108.
- 143 Exhibit 1600, pp. 5–7.
- 144 Exhibit 1595; Exhibit 1596.
- 145 Transcript, August 30, 2011, pp. 32–33.
- 146 PPR 20, p. 70. See also Exhibit 1589, p. 17.
- 147 Exhibit 1589.
- 148 Exhibit 1589, p. 12.
- 149 Exhibit 1589, p. 13.
- 150 Transcript, August 30, 2011, p. 74.
- 151 Transcript, September 22, 2011, pp. 82–83.
- 152 PPR 20, p. 70.
- 153 Exhibit 1589, p. 5.
- 154 Exhibit 1632.
- 155 Transcript, August 30, 2011, pp. 16–17.
- 156 Transcript, August 30, 2011, pp. 56–57.
- 157 Transcript, September 7, 2011, p. 28.
- 158 Transcript, August 30, 2011, p. 18.
- 159 Transcript, August 30, 2011, p. 21.
- 160 Transcript, August 30, 2011, p. 18.
- 161 Transcript, August 30, 2011, pp. 67–68, 106–7.
- 162 Exhibit 1803, pp. 6–7.
- 163 Transcript, September 7, 2011, pp. 34–35.
- 164 Transcript, August 30, 2011, pp. 67–68.
- 165 Transcript, September 22, 2011, pp. 78–79.
- 166 Transcript, August 30, 2011, p. 18.
- 167 Transcript, August 30, 2011, p. 26.
- 168 Transcript, August 30, 2011, p. 71.
- 169 Gavin Last, Transcript, August 30, 2011, p. 51.
- 170 Exhibit 1615, p. 9.
- 171 Transcript, September 1, 2011, p. 87.
- 172 Exhibit 663.
- 173 Transcript, April 5, 2011, pp. 28–31.
- 174 Exhibit 663.
- 175 Transcript, August 30, 2011, pp. 71–72.
- 176 Transcript, September 22, 2011, p. 79.
- 177 Transcript, September 1, 2011, p. 57.
- 178 Transcript, August 30, 2011, p. 61.
- 179 Exhibit 1717, p. 9.
- 180 Exhibit 1625; Exhibit 1629; Exhibit 1630.
- 181 Exhibit 1625, pp. 16–20; Exhibit 1629, pp. 6–8; Exhibit 1630, pp. 7, 9, 10, 16.
- 182 Transcript, August 30, 2011, p. 71.
- 183 Exhibit 1601, p. 2.
- 184 Exhibit 1601, pp. 2–3.
- 185 Transcript, September 22, 2011, pp. 80–82.
- 186 Transcript, August 30, 2011, p. 74.
- 187 Transcript, August 30, 2011, p. 108.
- 188 Transcript, September 22, 2011, p. 84.
- 189 Lawrence Dill, Transcript, August 29, 2011, p. 70.
- 190 Transcript, September 7, 2011, pp. 71, 73.
- 191 Transcript, August 30, 2011, p. 68.
- 192 Transcript, September 8, 2011, p. 5.
- 193 Clare Backman, Transcript, September 8, 2011, p. 5.
- 194 Transcript, September 8, 2011, pp. 5–6.
- 195 Transcript, August 23, 2011, p. 58.
- 196 Transcript, September 26, 2011, p. 79.
- 197 Transcript, September 7, 2011, pp. 83–84.
- 198 Transcript, August 31, 2011, p. 66.
- 199 Transcript, August 31, 2011, p. 89.
- 200 Transcript, August 31, 2011, p. 114.
- 201 Transcript, September 28, 2011, p. 42.
- 202 Transcript, August 30, 2011, pp. 69–70.
- 203 Transcript, August 23, 2011, p. 91.
- 204 David Bevan, Transcript, September 27, 2011, pp. 4–5; Exhibit 1942; Exhibit 1944.
- 205 B.C. Salmon Farmers Association's written submissions, pp. 139–40.
- 206 Transcript, September 8, 2011, p. 7.
- 207 PPR 20, p. 37.
- 208 PPR 20, p. 36.
- 209 Exhibit 1716, p. 5.
- 210 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002, ss. 9, 10(1), 10(2).
- 211 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002, s. 10(4).
- 212 *Finfish Aquaculture Waste Control Regulation*, BC Reg. 256/2002, s. 10(5).
- 213 *Aquaculture Regulation*, BC Reg. 78/2002, s. 4(1).
- 214 Exhibit 1560, p. 4.
- 215 For examples of annual Fish Health reports, see Exhibits 1560, 1670, 1671, 1672, and 1673.
- 216 PPR 20, pp. 35–36.
- 217 PPR 20, p. 41.
- 218 Transcript, September 1, 2011, pp. 29–30.
- 219 PPR 20, p. 92.
- 220 PPR 20, pp. 93–94.
- 221 Exhibit 1708.
- 222 Exhibit 1708, p. 1.
- 223 Exhibit 1708.
- 224 Exhibit 1594.
- 225 Transcript, September 1, 2011, p. 8.
- 226 Transcript, September 1, 2011, pp. 7–8.

- 227 Transcript, August 17, 2011, pp. 48–49.
- 228 Transcript, August 18, 2011, pp. 103–4.
- 229 Transcript, September 1, 2011, p. 9.
- 230 Transcript, September 8, 2011, p. 62.
- 231 Transcript, August 25, 2011, pp. 82–83.
- 232 Kerra Hoyseth, Transcript, September 1, 2011, pp. 10–12; Exhibit 1708, p. 4.
- 233 PPR 20, p. 96.
- 234 Transcript, September 1, 2011, pp. 33–34.
- 235 Transcript, September 1, 2011, p. 55.
- 236 Transcript, September 1, 2011, p. 11.
- 237 Fish Health Zones are identified in Appendix VI of the generic licence conditions. See Exhibit 1594, p. 31.
- 238 Transcript, September 1, 2011, pp. 11–12.
- 239 Exhibit 1706; Kerra Hoyseth, Transcript, September 1, 2011, pp. 13–14.
- 240 Exhibit 1706.
- 241 Transcript, September 1, 2011, pp. 13–14.
- 242 Kerra Hoyseth, Transcript, September 1, 2011, p. 14. See also PPR 20, p. 48.
- 243 Transcript, September 1, 2011, pp. 25–26.
- 244 Transcript, September 1, 2011, p. 18.
- 245 Transcript, September 1, 2011, p. 15, 108–9.
- 246 Transcript, September 1, 2011, p. 15. See also Exhibit 1707, the draft Finfish Aquaculture Site Inspection Checklist.
- 247 Transcript, September 1, 2011, p. 16.
- 248 Exhibit 1707.
- 249 Exhibit 1707, p. 9.
- 250 Transcript, September 1, 2011, p. 16.
- 251 Brian Atagi, Transcript, September 1, 2011, p. 18.
- 252 Brian Atagi, Transcript, September 1, 2011, p. 76.
- 253 Andrew Thomson, Transcript, September 1, 2011, p. 52.
- 254 Brian Atagi, Transcript, September 1, 2011, pp. 29, 76–77.
- 255 Kerra Hoyseth, Transcript, September 1, 2011, p. 19.
- 256 Transcript, September 1, 2011, p. 20.
- 257 PPR 20, pp. 97–98.
- 258 PPR 20, pp. 97–98.
- 259 Andrew Thomson, Transcript, August 30, 2011, p. 24. See also Exhibits 1642 and 1651.
- 260 Transcript, September 1, 2011, p. 114.
- 261 Transcript, August 30, 2011, pp. 93–94.
- 262 Transcript, August 31, 2011, p. 3.
- 263 Exhibit 1654, p. 1.
- 264 Exhibit 1699; Exhibit 1701.
- 265 Exhibit 1703, p. 2.
- 266 Exhibit 1641, pp. 8–9.
- 267 Transcript, September 27, 2011, p. 8.
- 268 Transcript, September 27, 2011, p. 8.
- 269 Exhibit 661.
- 270 Exhibit 1942.
- 271 Transcript, September 27, 2011, pp. 3–4.
- 272 Exhibit 1641, pp. 8–9.
- 273 Transcript, September 7, 2011, p. 16. See also Mia Parker, Transcript, September 7, 2011, p. 17.
- 274 Claire Dansereau and Susan Farlinger, Transcript, September 27, 2011, p. 8.
- 275 Andrew Thomson, Transcript, August 30, 2011, p. 111. See also Andrew Thomson, Transcript, September 1, 2011, pp. 103–5.
- 276 Transcript, August 30, 2011, pp. 112–13.
- 277 Transcript, September 1, 2011, p. 112.
- 278 Exhibit 1648, p. 1. See also Exhibits 1647, 1657, 1638, and 1639.
- 279 Transcript, August 31, 2011, p. 7.
- 280 Transcript, August 31, 2011, pp. 8–9.
- 281 Exhibit 1641, pp. 8–9.
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- 283 Transcript, August 23, 2011, pp. 94–95.
- 284 Transcript, August 25, 2011, p. 36.
- 285 Transcript, August 25, 2011, p. 37.
- 286 Transcript, September 7, 2011, p. 17.
- 287 Transcript, September 7, 2011, pp. 48–49.
- 288 Transcript, September 8, 2011, pp. 11–12.
- 289 Transcript, September 8, 2011, pp. 26–27, 31.
- 290 Transcript, September 6, 2011, p. 22.
- 291 Exhibit 1633, p. 2.
- 292 Transcript, September 7, 2011, p. 90. See also Exhibit 1636, pp. 2–3.
- 293 Mia Parker, Transcript, September 7, 2011, p. 93.
- 294 PPR 20, p. 35. See also B.C. Seafood Industry Year in Review reports for the following years: 1993 (Exhibit 504); 1996 (Exhibit 505); 2000 (Exhibit 506); 2004 (Exhibit 510); and 2007 (Exhibit 507).
- 295 PPR 20, pp. 35–36.
- 296 Exhibit 1716.
- 297 Exhibit 1590 is a draft of this policy, dated July 10, 2011. Exhibit 1599 is an earlier draft of the same policy, dated June 29, 2011.
- 298 Exhibit 1590, p. 1.
- 299 Exhibit 1590, pp. 2–3.
- 300 Exhibit 1590, pp. 3–5.
- 301 Transcript, September 22, 2011, p. 85.
- 302 Transcript, August 30, 2011, pp. 22–23.
- 303 Transcript, September 7, 2011, p. 16.
- 304 Transcript, September 7, 2011, p. 96.
- 305 Transcript, September 7, 2011, pp. 93–94.
- 306 Transcript, September 7, 2011, pp. 90–91.
- 307 See Exhibit 1597 for screenshots from DFO's website.
- 308 Brian Atagi and Andrew Thomson, Transcript, September 1, 2011, p. 20.
- 309 Ruling Re: Rule 19 Application for Production of Aquaculture Health Records, December 8, 2010, pp. 20–21.
- 310 Transcript, September 7, 2011, p. 89.

Chapter 9 • Fish health management

■ Introduction

My Terms of Reference direct me, among other things, to consider the policies and practices of the Department of Fisheries and Oceans (DFO), to investigate and make independent findings of fact on the causes of the decline of the sockeye salmon fishery, including the impact of disease, and to develop recommendations for improving this fishery's future sustainability. "Fish health" is not explicitly named in the Terms of Reference, and early in this Inquiry I had not identified it as a distinct theme, although "diseases, viruses, bacteria, and parasites" were identified in my Interim Report as topics to be explored.¹ Issues of fish health and fish health management emerged from several different hearing topics as important themes for my consideration, especially in laying a foundation for recommendations to improve the future sustainability of Fraser River sockeye.

This chapter addresses fish health management of wild and cultured salmon. As I learned in the

Commission's hearings on disease, most of the work on fish health – both scientific research and management practices – is directed at cultured fish. Although some research has been done on the health of wild fish, much of what is known or suspected about the health of wild salmon, including sockeye, comes from research on cultured salmon. Similarly, fish health management efforts have focused on cultured rather than wild fish.

The transfer of diseases and pathogens between farmed and wild salmon was a concern of many participants in this Inquiry and a common theme in public submissions. These concerns escalated during the fall of 2011 when two non-government laboratories reported positive test results for infectious salmon anemia (ISA) virus – a disease known in Atlantic salmon – in wild Pacific salmon off the BC coast. These reports were circulated in local and international media. They prompted further document disclosure from Canada, revealing testing for ISAv in Pacific salmon by DFO scientists in 2003–4 and more recently. I reopened the Commission's hearings

in December 2011 to hear evidence about tests for ISAv conducted on wild Pacific salmon, including Fraser River sockeye, and Canada's management responses to these tests. Later in this chapter, I review the evidence I heard about ISAv as a case study of how DFO addresses fish health management issues. I discuss ISAv as a potential cause of the decline in Volume 2 of this Report.

In Chapter 8, Salmon farm management, I summarized concerns about fish health expressed in public submissions. In short they are as follows:

- Diseases and pathogens may be transferred from farmed fish to wild fish.
- Farmed fish pose a risk of introducing new or exotic pathogens.
- Government agencies are not transparent with information about fish health.
- Non-government scientists and the public lack access to scientific data that could be used to evaluate or challenge the work of government or industry scientists.
- DFO or the Canadian Food Inspection Agency (CFIA) has "covered up" evidence of ISAv in BC salmon.
- Science and laboratory testing for fish diseases in commercially valuable fish has been inappropriately politicized.

One public submission also raised concerns about the spread of diseases from hatchery salmon to wild salmon.

In this chapter, I begin by discussing the regulatory regime for fish health management in Canada, including the international context for Canada's fish disease-reporting obligations, and I identify the main programs and organizational responsibilities. Following that background, I review the evidence on fish health management in wild salmon (including assessments or surveillance plans to assess fish health), farmed salmon (including management options to reduce the risk of disease or pathogen transfer to wild sockeye salmon), and enhancement facilities (including issues about availability or lack of information). I then set out the evidence from the hearings on ISAv, including test results and management responses to those tests. Finally, based on the evidence discussed, I make findings to support the recommendations set out in Volume 3 of this Report.

■ The regulatory regime for fish health management

Within Canada, the regulatory regime for fish health management flows from the *Health of Animals Act* and the *Fisheries Act*.² The *Health of Animals Act* addresses reportable diseases that are significant to Canada's trade relations. The *Fisheries Act* regime includes regulations to control, monitor, and report the presence of disease in aquaculture facilities and regulations dealing with interprovincial transfers of fish. These Acts and regulations operate within the context of Canada's international reporting obligations described below.

International context

Canada is one of 28 member states of the Office International des Épizooties (OIE, also known as the World Organisation for Animal Health). The OIE addresses animal health globally by publishing standards on animal health, animal welfare, and food safety. It also collects, analyzes, and disseminates animal health information. Standards related to aquatic animal health can be found in the OIE's Aquatic Animal Health Code (OIE Aquatic Code).³ As a member, Canada is obliged to report outbreaks of OIE-listed diseases.⁴

OIE-listed diseases

The OIE lists the following finfish diseases as reportable, which means that member countries must report confirmed cases to the OIE: epizootic hematopoietic necrosis, epizootic ulcerative syndrome (red-spot disease), gyrodactylosis, infectious hematopoietic necrosis (IHN), infectious salmon anemia (ISA), koi herpes virus disease, red sea bream iridoviral disease, spring viremia of carp, and viral hemorrhagic septicemia (VHS).⁵ Dr. Michael Kent, author of Technical Report 1, Infectious Diseases, noted that IHN poses a high risk to Fraser River sockeye and that VHS poses a low risk.⁶ (See further discussion of Dr. Kent's report in Volume 2 of this Report.) Dr. Kent did not identify any of the other OIE-listed diseases as being relevant to sockeye salmon. However, following his testimony, ISA emerged as a topic of concern for sockeye salmon in British Columbia (see case study of ISAv below).

Reference laboratories

The OIE has set up a system of reference laboratories:

OIE Reference Laboratories are designated to pursue all the scientific and technical problems relating to a named disease or specific topic. The Expert, responsible to the OIE and its Members with regard to these issues, should be a leading and active researcher helping the Reference Laboratory to provide scientific and technical assistance and expert advice on topics linked to surveillance and control of the disease for which the Reference Laboratory is responsible. Reference Laboratories may also provide scientific and technical training for personnel from Members, and coordinate scientific and technical studies in collaboration with other laboratories or organizations, including through OIE Laboratory Twinning.⁷

OIE reference laboratories are different from a member country's national reference laboratories, although many OIE reference labs are located within their host countries' government laboratory systems. Countries with the capacity may set up their own system of national laboratories, which they use to conduct diagnostic tests on OIE-listed diseases. Dr. Peter Wright, national manager of DFO's National Aquatic Animal Health Laboratory System (NAAHLS), described the difference between OIE reference laboratories and national reference laboratories as follows:

It's quite normal for any country like Canada, the U.S., anywhere in the U.K., that you do have your own national laboratory system, whether it's for aquatic animals or terrestrial animals, and within those – the infrastructure of those lab systems you will designate a national reference laboratory for specific diseases or groups of diseases.

The OIE designation is just that, an OIE designation. It has really no implications for the host country, itself. The idea is that with the OIE you have different regions around the world and they try and put a reference laboratory into each of the individual regions and they're there to provide support to those member countries of the OIE that

may not have the laboratory or veterinary infrastructure to conduct investigations for the diseases that those reference labs are responsible for.⁸

Diagnostic testing for OIE-listed diseases

The OIE distinguishes between “suspected” and “confirmed” cases of aquatic animal diseases.⁹ The definitions are disease dependent. For example, the definitions of suspected and confirmed cases of ISA appear later in this chapter. Both suspected and confirmed cases may be reported to the OIE; however, Canada's practice is to report only confirmed cases of reportable diseases.¹⁰

The OIE publishes recommended diagnostic tests for aquatic animal diseases in the OIE Aquatic Code.¹¹ However, the OIE does not dictate what tests a country must use for listed diseases. A country may use whatever tests it wants so long as the test is validated as comparable to the ones recommended by the OIE.¹² The OIE has developed validation templates for countries to use for both screening and confirmatory diagnostic tests.¹³ Validation includes ensuring that the test is repeatable, and that it works in the field (by testing on reference animals that are known to have or not to have the disease in question, or sometimes by using models to simulate what the test should detect).¹⁴

Canada has a test method agreement with the OIE, which sets out how Canada approaches diagnostics on behalf of the OIE.¹⁵ For example, Canada does not use the OIE-recommended tests for ISAv; it uses a test that it has validated as comparable.¹⁶ (For more on ISAv testing, see the ISAv case study below.)

The OIE Aquatic Code also contains a chapter on aquatic animal health surveillance, which provides guidance to member countries on how to set up surveillance systems to demonstrate freedom from disease.¹⁷

The Health of Animals Act and related regulations

CFIA, under the minister of agriculture and agri-food, administers the *Health of Animals Act*, which was amended to include aquatic animals, like salmon, in December 2010.¹⁸ Under this Act, “disease” includes “(a) a reportable disease and any other disease that may affect an animal or

that may be transmitted by an animal to a person, and (b) the causative agent of any such disease.”¹⁹ Reportable diseases are “diseases that are of significant importance to animal health and to the Canadian economy.”²⁰ Reportable diseases are set out in the *Reportable Diseases Regulations*. Aquatic animal diseases were added to these regulations in January 2011.²¹ The *Reportable Diseases Regulations* list several salmon diseases including IHN, VHS, infectious pancreatic necrosis (IPN), and ISA,²² but not all the OIE-listed aquatic diseases. Immediately notifiable diseases are “serious diseases of concern to animal health and to the Canadian economy.”²³ They are listed in the *Health of Animals Regulations*.²⁴ Although some of these are fish diseases to which Fraser River sockeye may be susceptible, none was the focus of evidence before me.

The definition of “disease” under the *Health of Animals Act* is broad enough to include non-reportable disease, but the provisions of the Act do not describe a role for CFIA in relation to non-reportable diseases. CFIA’s role depends on a disease being reportable: “Until an incident affecting aquatic animals is linked to a Reportable or Immediately Notifiable disease, the completion of the disease outbreak investigation resides with DFO and/or provincial / territorial authorities.”²⁵

The *Health of Animals Act* places an obligation on persons who own or have the “possession, care or control of an animal” to notify a veterinary inspector designated under the *Canadian Food Inspection Agency Act* “of the presence of a reportable disease or toxic substance, or any fact indicating its presence, in or around the animal, immediately after the person becomes aware of the presence or fact.”²⁶ It also prohibits concealing the existence of a reportable disease or toxic substance among animals.²⁷

Although mandatory reporting is new in the aquatic world, Dr. Kim Klotins, acting national manager, Disease Control Contingency Planning, CFIA, explained that mandatory reporting has been in place in Canada for terrestrial animals since the inception of the *Health of Animals Act*.²⁸ To advise Canadians about their obligations for reporting aquatic animal diseases, in January 2011, Dr. Klotins drafted and distributed directives to “Canadians who own or work with aquatic animals” and to “veterinarians and aquatic animal health specialists.”²⁹ She sent the directives to DFO, colleges and universities, and others across Canada who work with aquatic animals.³⁰

Dr. Klotins explained what it means to have a “suspicion” of a reportable disease sufficient to trigger the reporting requirements under the *Health of Animals Act*, and what CFIA was doing to educate people about what is suspicious:

It means that they have some information or some idea that the disease may be present in the fish that they own – they possess, own, care or have control of. Some fact. And it could be whatever fact they think gives them the suspicion that the disease is there.

...

I guess what we’re also planning to do, and we’ve started to do, is to provide some information to all who are obligated to notify about the, you know, information about the various diseases, or reportable diseases.

We have a couple of the Q and A fact sheets up on the external website. The rest are in the process of being approved. And we have pictures that are going with those diseases. We let them know where we think they occur in Canada right now, and we give probably the most common clinical signs and who they can contact if they suspect [an animal] has disease.³¹

Dr. Klotins said that someone in a laboratory might become suspicious when they receive a request to test samples for a reportable disease. She said CFIA prefers to be notified sooner rather than later, “so that we can start investigating whether there is some basis to the suspicion. And if, for example, if it occurs in cultured animals, perhaps we can initiate an inspection and go visit the site, take a look at the animals, see if we need to collect more samples that can be submitted to the NAAHLS laboratories.”³² (The National Aquatic Animal Health Laboratory System is discussed below.)

Facilities such as salmon farms, enhancement facilities, or even research laboratories may be inspected by a CFIA inspector or officer “for the purpose of detecting diseases or toxic substances or ensuring compliance with [the *Health of Animals Act*] and the regulations.”³³ Further, the *Health of Animals Act* gives CFIA inspectors or officers the power to seize animals or things in prescribed situations where the inspector believes an offence has been committed.³⁴ No

person shall “obstruct or hinder” an inspector or officer performing duties or functions under the Act, and persons in charge of places entered by an inspector or officer shall provide “reasonable assistance” and relevant information.³⁵ So when CFIA requests that samples be provided in relation to a reportable disease, co-operation is expected. The Act does provide for compensation to be paid for animals destroyed or injured, based on the market value of the animal minus any value of its carcass.³⁶

Section 14 of the *Health of Animals Act* allows the minister of agriculture and agri-food to make regulations prohibiting the importation of any animal or other thing into Canada “for the purpose of preventing a disease or toxic substance from being introduced into or spread within Canada.”³⁷ Part XVI of the *Health of Animals Regulations* pertains to aquatic animals. Any fin-fish listed in Schedule III (which includes Atlantic salmon and all species of Pacific salmon) “may be inspected, segregated and tested for any disease listed in the schedule to the *Reportable Diseases Regulations*; and (b) disease eradication programs may be instituted for preventing the spread of any disease listed in the schedule to the *Reportable Diseases Regulations*.”³⁸ Section 191 requires a person to obtain an import permit before bringing into Canada any of the aquatic animals listed in Schedule III, including germplasm (eggs or sperm). Section 199 prohibits movement of an aquatic animal (including germplasm) from a province infected with a disease to an area free of that disease, except in accordance with a permit issued under section 160.³⁹

The Fisheries Act and related regulations

As described in Chapter 3, Legal framework, DFO administers a number of regulations under the *Fisheries Act*, two of which address issues of fish health: the *Pacific Aquaculture Regulations* (PAR),⁴⁰ discussed in Chapter 8, Salmon farm management, and the *Fish Health Protection Regulations* (FHPR).⁴¹

The PAR apply to both salmon farms and enhancement facilities.⁴² Under the PAR, the minister has the authority to make conditions of licence related to fish health, including the following:

- (f) the measures that must be taken to control and monitor the presence of pathogens and pest in the aquaculture facility;
- (g) the measures that must be taken to monitor the presence of pathogens and pests in wild fish in the waters that may be affected by the operations of the aquaculture facility;
- ...
- (m) the notice that must be given to the Minister before
 - (i) a substance is used to treat fish for pathogens or pests;
 - (ii) fish are transferred to the aquaculture facility, or
 - (iii) fish are harvested;
- ...
- (o) the records that must be kept in relation to
 - (iii) any diagnosis or treatment of a fish pathogen or pest present in the aquaculture facility, including the extent to which the pathogen or pest affects the fish in the facility,
 - (iv) any substance used to treat fish for pathogens or pests, including the quantity used and the date and method of its administration,
 - (v) the number and species of fish that die prior to harvest, and the cause of death,
- ...
- (ix) the data collected in the monitoring of the environmental impact of the aquaculture facility’s operations.⁴³

Under the PAR regime for aquaculture in British Columbia, routine transfers of cultured fish within the same “salmonid transfer zone” within the province are dealt with under conditions of licence.⁴⁴ Other introductions and transfers, such as those between salmonid zones identified in Appendix III of the conditions of licence for salmon farms, require permits issued by DFO under the FHPR but reviewed by the Introductions and Transfers Committee established under the National Code on Introductions and Transfers of Aquatic Organisms (see below).⁴⁵

The FHPR allows a local fish health officer (who is defined as “a person approved as a local fish health officer in charge of the administration and enforcement of these Regulations”⁴⁶) to issue interprovincial carrying permits for cultured and

wild fish as long as the person applying for the permit has obtained a certificate that fish are free of diseases listed in the schedules to the Regulations, or as long as the local fish health officer is satisfied that any such diseases listed on the certificate will not be harmful to the conservation and protection of fish in that province.⁴⁷ A “certificate” may be obtained from a fish health official (who is defined as “a person approved to inspect fish and fish sources for the purposes of these Regulations”).⁴⁸ The FHPR apply to all species of Pacific salmon and Atlantic salmon. The diseases (or their causative agents) listed in the schedules are: VHS, IHN, IPN, whirling disease, ceratomyxosis, furunculosis, and enteric redmouth disease.

Stephen Stephen, director, Biotechnology and Aquatic Animal Health Science Branch, DFO, Ottawa, testified that the FHPR were “developed many years ago and to deal with the import of salmonids, any species in the family *Salmonidae*, so Arctic char, whitefish, trout, salmon, both Pacific and Atlantic,” into Canada from international locations and between provinces within Canada.⁴⁹ In December 2011, Canada amended the FHPR to remove a duplication of regulatory authority between DFO and CFIA (under the *Health of Animals Regulations*, discussed above). Mr. Stephen said the definition of “import” under the FHPR has been amended to mean import “from one province to another instead of from outside the country into Canada.”⁵⁰ He explained that, “with the world coming into more awareness of aquatic animal diseases in trade, it was seen as a real necessity for Canada to have a broader capacity to deal with diseases of finfish beyond just salmon.”⁵¹ Canada has developed that broader capacity under the lead of CFIA, focusing on international issues of safe trade and working under the auspices of the National Aquatic Animal Health Program (NAAHP), discussed below.⁵²

As explained above, because CFIA takes the lead only on reportable aquatic diseases under the *Health of Animals Act* regime, DFO is responsible under its conservation mandate to deal with any fish diseases that arise in Fraser River sockeye that are not listed under the regulations as reportable or immediately notifiable. (See chapters 3, Legal framework, and 4, DFO overview, for further details on DFO’s conservation mandate.)

National Code on Introductions and Transfers of Aquatic Organisms

An “introduction” of an aquatic organism is “the intentional or accidental transportation and release of the organism into an environment outside its present range (ICES 1988).”⁵³ A “transfer” is “the shipment of individuals of a species or population of an aquatic organism from one location and its release to another within its present (geographic) range (ICES 1988).”⁵⁴

As of the Commission’s hearings on aquaculture in August 2011, DFO’s Introductions and Transfers Committee reviewed applications for fish transfers that are not addressed under conditions of licence. The committee reports its operations to the director general of the Aquaculture Management Directorate (AMD) at DFO.⁵⁵ Trevor Swerdfager, former director general, AMD, said that the system is national in structure, though there are nuances in different provinces.⁵⁶

The committee’s review of applications includes a risk assessment that considers ecological, disease, and genetic factors.⁵⁷ The committee may identify potential mitigation requirements (for example, egg disinfection, treatment of effluent, quarantine holding) in its recommendations, and these may form conditions of licence.⁵⁸

Dr. Kyle Garver, research scientist (virology), DFO, testified that the Introductions and Transfers Committee oversees and monitors the movement of (cultured enhanced) fish between different watersheds to ensure diseases are not being spread from one to another.⁵⁹ Dr. Peter McKenzie, veterinarian and fish health manager for the salmon-farming company Mainstream Canada, testified that the introductions and transfer process has been in place for years, controls any introduction in British Columbia, and is a collaborative effort between the federal and provincial governments.⁶⁰

National Aquatic Animal Health Program

CFIA and DFO co-deliver the NAAHP, which began in 2005. CFIA describes it as follows:

The Canadian Food Inspection Agency’s (CFIA) National Aquatic Animal Health Pro-

gram (NAAHP) is a science-based regulatory program. It addresses aquatic animal diseases of finfish, molluscs and crustaceans.

The program is consistent with international standards set by the World Organisation for Animal Health (OIE).

The program regulates aquatic animal health as per the *Health of Animals Act* and Regulations.

The NAAHP is co-delivered by the CFIA and Fisheries and Oceans Canada (DFO). The CFIA is the lead federal authority and is responsible for the administration and enforcement. DFO provides the laboratory and research expertise through the National Aquatic Animal Laboratory System.

The Program is being implemented using a phased approach. Mandatory disease notification comes into effect immediately upon publication of the regulations in Canada Gazette, Part II. One year following that date, the requirements for import permits will be brought into force. Movement controls within Canada will likely come into force two years later.⁶¹

During the ISAv hearings, Dr. Klotins described the NAAHP as a partnership of CFIA and DFO.⁶² The partnership proceeds according to a memorandum of understanding, which describes the partners' roles:

The NAAHP will be co-delivered with CFIA providing the overall program direction under the authority of the *Health of Animals Act* and the field operations capability for the aquaculture industry. DFO will perform the surveillance and monitoring activities for the wild stock, deliver and oversee the diagnostic and research and development support responsibilities.⁶³

Dr. Klotins described the work of CFIA under NAAHP as being “to design and implement the National Aquatic Animal Health Program, and the program consists of import controls, disease controls within the country, expert health certification, and with support from risk assessment and surveillance.”⁶⁴ Mr. Stephen described DFO's work under the program:

DFO ... has the responsibility under the program for the diagnostic research, the diagnos-

tic testing, and providing scientific advice on diagnostic activities under the scope of the program. The program was funded in 2005 by the Federal Government and it was a partnership envisioned because of DFO's decade-old knowledge and experience in testing for aquatic animal diseases paired up with CFIA's regulatory authorities under the *Health of Animals Act* and *Regulations*. And our Moncton laboratory is one of three key laboratories doing the diagnostic work, and each laboratory is designated based on the type of diseases as a national reference laboratory.⁶⁵

Mr. Stephen said the DFO laboratories within the national reference laboratory system are the Gulf Fisheries Centre (DFO Moncton), the Pacific Biological Station (PBS) in Nanaimo, the Freshwater Institute in Winnipeg, and the biocontainment laboratory in Charlottetown.⁶⁶ Dr. Wright said that these labs are called the National Aquatic Animal Health Laboratory System (NAAHLS), and they use harmonized testing platforms.⁶⁷

Before NAAHLS staff may conduct diagnostic testing on behalf of CFIA, the president of CFIA must designate them as analysts under section 32 of the *Health of Animals Act* and subsection 13(3) of the *Canadian Food Inspection Agency Act*.⁶⁸ Under that same power of designation, CFIA may designate non-government laboratories to conduct diagnostic work for CFIA, provided they prove to CFIA that they use testing protocols validated according to the “Validation Pathway for NAAHLS Diagnostic Test Methods, Dossier Template.”⁶⁹

CFIA mandate and policies related to NAAHP

CFIA's mission is to safeguard “food, animals and plants, which enhance the health and well-being of Canada's people, environment and economy.”⁷⁰ With respect to aquatic animals, Dr. Klotins testified that the mandate of CFIA is “actually to facilitate safe trade of aquatic animals. It's not to protect the interests, but it's to facilitate safe trade by working on negotiations for technical market access.”⁷¹ She used the example of ISAv to make her point:

So if, let's say, we do find ISA[v] in B.C. and all of a sudden markets are closed, our role is then to try to renegotiate or negotiate market access to those countries. Now, what it will be is a matter of they'll let us know what the requirements are. We'll let them know what we can do and whether we can meet that market access. If we can't meet it, then there will be no trade basically.⁷²

CFIA has developed a number of policies or plans under the NAAHP, some of which are still in draft form. In relation to mandatory reporting of diseases, CFIA has developed the Mandatory Notification and Suspect Phase Disease Response Policy for the National Aquatic Animal Health Program to describe the mandatory notification policy and to determine when to initiate the "suspect" phase of disease response (the phase that begins when CFIA is notified of a reportable aquatic animal disease⁷³).⁷⁴ Figure 1.9.1 depicts the phases of disease response in relation to cultured animals.

Also in relation to cultured fish, CFIA has developed the Procedure for Receipt and Evaluation of Mandatory Notifications for the National Aquatic Animal Health Program that describes the "procedure for CFIA staff to follow when receiving and processing notifications concerning reportable, immediately notifiable, and emerging diseases."⁷⁵

The (draft) Aquatic Animal Health Functional Plan (Functional Plan) "is intended for CFIA staff members who are responsible for responding to aquatic animal disease incidents."⁷⁶ The Functional Plan sets out the CFIA process for responding to emergencies, and in particular outlines the responses to be taken in the case of disease outbreak, detection, or suspicion in cultured or wild aquatic animals. Dr. Klotins explained that (as of December 2011) CFIA was also in the process of developing hazard-specific plans for reportable diseases.⁷⁷

For wild fish, the Functional Plan sets out a flow chart showing the response process (see Figure 1.9.2). Both CFIA and DFO have roles in relation to wild aquatic animals. When CFIA initiates an investigation based on disease outbreak, detection, or suspicion, one of its primary concerns is chain of custody. Dr. Wright said that establishing a chain of custody of fish samples ensures that "CFIA knows where they came from, how they were collected, how they were preserved, how they were shipped, and when they were received in the lab, and that chain of custody goes all the way through every lab procedure that's done, all the way to the point where the report of analysis is issued."⁷⁸ Unless CFIA is notified sufficiently early, the agency will not be able to establish a chain of custody to confirm the presence of a disease.

Steps taken by CFIA and others to investigate reports of ISAv in wild Pacific salmon are discussed in the case study at the end of this chapter.

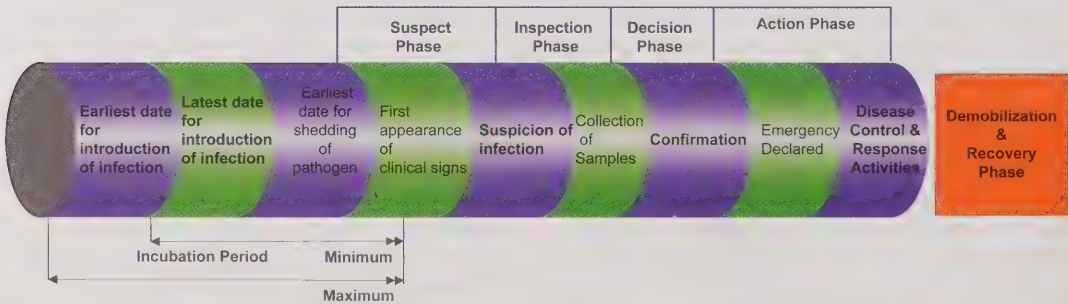


Figure 1.9.1 Aquatic animal health disease response phases for cultured fish

Source: Exhibit 2105, p. 157.

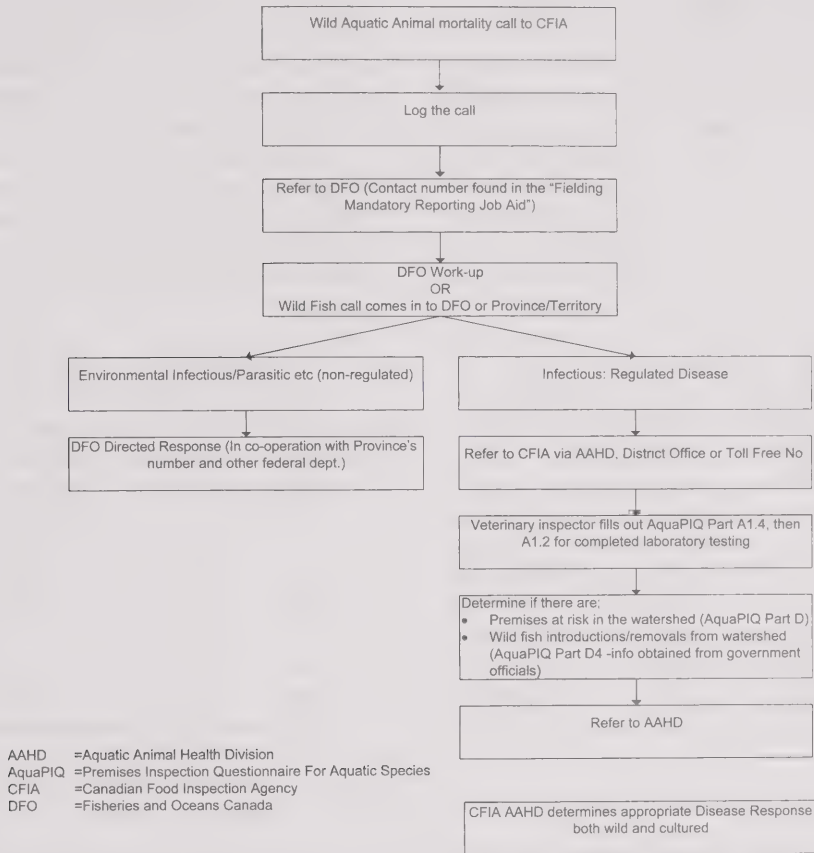


Figure 1.9.2 Flow diagram illustrating the disease-response process for wild aquatic animals

Source: Reproduced from Exhibit 2105, p. 193.

■ Fish health management in wild salmon

Dr. Garver told me, “It is very difficult to mitigate disease in wild populations ... it is hard to eliminate [a] pathogen from a population. But you can track it.” He said that sometimes diseases in wild populations can be confined to a certain watershed “by eliminating movement of fish from one watershed to another,” though he gave no examples of how this could be accomplished or whether it was possible with a migrating species such as sockeye salmon.⁷⁹ In general, I heard little evidence on what could be done to manage fish health in Fraser River sockeye. Instead, management efforts are targeted at farmed

salmon or hatchery salmon, as discussed in the sections below.

Similarly, little research has been done on fish health in wild fish stocks; most of the research is in captive stocks.⁸⁰ Dr. Kent testified that studies of infectious diseases, parasites, viruses, and bacteria at a population level in wild salmon have “been very minimal.” Investigating disease and chronic infections at a population level requires repeated sampling from the same population, which poses a problem with salmon because they are difficult to track in the ocean. Also, many populations of salmon are protected, so there are a limited number of samples available.⁸¹

Dr. Kent identified another factor that makes it difficult to carry out fish health surveillance work: when a fish in the ocean dies, it disappears. Dead

wild fish drop to the bottom of the ocean, never to be seen again. Dr. Kent testified that, even if a devastating viral disease swept through a wild population killing large numbers of fish, scientists might not be able to detect it.⁸²

Dr. Stewart Johnson, head, Aquatic Animal Health Section, Science, DFO Pacific Region (see description below), testified that it is difficult to relate laboratory studies to wild populations. For example, most studies focus on a single pathogen whereas most wild fish carry multiple pathogens.⁸³ Dr. Johnson said, “I cannot think of any papers off the top of my head where they’ve actually studied multiple infections in fish.”⁸⁴ Further, it is “extremely difficult” to maintain sockeye in a laboratory.⁸⁵ Dr. Johnson did say that much can be learned generally about sockeye stress responses from research done on other salmonid species, but that “we would need to do these particular studies on sockeye salmon to actually set the limits of their tolerance.”⁸⁶

Dr. Laura Richards, regional director, Science, DFO Pacific Region, testified that the department is aware of the “gap” in research with respect to wild fish health and is looking for opportunities to address this gap.⁸⁷ She said that DFO’s science research priorities are directed by its clients:

I’d have to say that our priorities for research are very much weighted by the need for us to provide advice. So in the context of working on fish disease, we are working together, and one of our major clients in terms of the provision of science advice is the Canadian Food Inspection Agency, who are the leaders in our National Aquatic Animal Health Program. And so we, you know, given that obviously we have limited resources to spend on things like research, we do look for direction and we work with them to identify priorities.

We also work with our clients or others in the Department, including those in Fisheries Management and those responsible for Aquaculture Management to help us identify the priorities.⁸⁸

Dr. Richards did not agree with the proposition that there is a “serious” deficiency in fish health information for wild fish, but she said, “[T]here is a lack of evidence on this and a large number of other topics.” By way of explanation, she said that DFO

Science attempts to do research with respect to the questions of the day; now that disease questions have been raised, DFO Science is trying to address them.⁸⁹ Dr. Kent said that during his 11 years at DFO there was a “frustration” among scientists “in that they’ll be working on a project and it does not come to completion or significant progress because of pressure from political reasons” and that resources are redirected to the “disease of the day that has become popularized in the media.”⁹⁰ He said that is why work was not continued on *Parvicapsula*,⁹¹ a disease he rated as high risk to Fraser River sockeye.⁹² That work was supplanted by work on sea lice.

Dr. Richards said it was not the case that DFO has done no studies in the last decade related to disease transmission from salmon farms to wild fish, but she had difficulty identifying anything other than sea lice work of recent years and work related to water circulation and pathogen dispersion started in 2010 or 2011 by Dr. Garver.⁹³ When faced with the proposition that the only reason DFO has not seen evidence of disease transmission from farmed to wild salmon is that DFO has never studied this topic, Dr. Richards said, “I don’t think that’s a fair statement.” Yet she went on to say, “[W]e would have done the studies if we had thought that we had seen any evidence that [disease transfer to wild stocks] was a possibility.”⁹⁴

Dr. Richards did say that survey and monitoring work on wild fish “is important and is part of the function that government would carry out.”⁹⁵ To that end, DFO began assessing the health of Fraser River sockeye in 2010, and in the fall of 2011, CFIA began to develop a surveillance plan for monitoring wild Pacific salmon for the reportable diseases (or their disease agents) ISA, IHN, and IPN. These initiatives are discussed below.

Roles and responsibilities

Both DFO and CFIA have roles and responsibilities in relation to the health of wild fish. As discussed above, under the NAAHP and depicted in Figure 1.9.2, once a regulated (or reportable) disease is suspected in wild fish, CFIA assumes responsibility for conducting an investigation to confirm whether that disease exists. It determines an appropriate disease response in order

to satisfy the concerns of trade partners who purchase wild Canadian seafood. (See also ISAv case study, below.)

Also, as discussed above, DFO has a role under the NAAHP to perform surveillance and monitoring activities and diagnostic research and development.⁹⁶ During the ISAv hearings, Nellie Gagné, molecular biology scientist and laboratory supervisor, Molecular Biology Unit, DFO Moncton, testified about how a DFO diagnostic laboratory determines what viruses to test for in wild fish:

There's a list of viruses or diseases that are regulated in the sense that we look for them because they are of a concern for import and export, for example, so the decisions for the virus tests that we have to do, doesn't rely solely on my shoulders. It's based on, like I said, import / export, presence of viruses or absence of viruses in other regions, zones or other countries, so it's a more complex question to answer that just there.⁹⁷

In addition, as discussed above, DFO's conservation mandate includes addressing those diseases that do not fall within the NAAHP regulatory program. This would include diseases that are not reportable, or research into the detection of novel or emerging diseases or those not previously known to exist in Fraser River sockeye.

DFO Pacific Region's Science Branch contains an Aquatic Animal Health Section (sometimes called the Fish Health Group) under the Salmon and Freshwater Ecosystems Division.⁹⁸ Dr. Johnson heads the Aquatic Animal Health Section. He reports to the division manager, Mark Saunders, who reports to the Pacific regional director of Science, Dr. Richards. The Aquatic Animal Health Section has approximately 25 staff (research scientists, aquatic science biologists and technicians, and one veterinarian).⁹⁹ Dr. Johnson testified that the Fish Health Group's main role is to "provide science-based advice for managers. And so we have to be somewhat responsible to questions which are posed to managers, and that can have an impact on, you know, longer term research programs."¹⁰⁰ In response to a question about whether scientists have any ability to decide for themselves what to work on, Dr. Johnson said the following:

I think that both the senior managers, as well as fish managers, do listen to the Science staff when they do propose new areas of up-and-coming importance for disease studies. And most Science staff have other projects which may or may not be funded by DFO which is usually more along the lines of things which they are personally interested in, as well. So the overall – although the overall goal of Science is to provide science-based advice to senior management, there is lots of opportunity to work on other things and lots of opportunity to obtain funding from other groups and other agencies such as NSERC [National Sciences and Engineering Research Council] to do other projects.¹⁰¹

The Salmon and Freshwater Ecosystems Division also includes a Molecular Genetics Section (sometimes called Salmon Genetics) headed by Dr. Kristina Miller. This section consists of approximately 30 staff (research scientists, aquatic science biologists, and technicians).¹⁰² Dr. Miller has used molecular genetics techniques to study disease in salmon, as described below and in Volume 2 of this Report.

Sockeye health assessment in the Strait of Georgia

After the poor return of Fraser River sockeye in 2009, DFO developed a three-year program to survey sockeye salmon health. Dr. Johnson described the program as follows:

We basically came up with a program to approach sockeye salmon health more from an overall health perspective rather than simply doing more surveys for disease. So the goal of this program is to integrate with our fisheries biologists, fisheries ecologists, the disease staff, Dr. Miller's group [Molecular Genetics Section], to come up with an overall assessment of health status of Fraser River sockeye starting in the lake, throughout their period of migration through the Strait of Georgia. So we received three years of funding. The first field season was in 2010 and that year we also received some support [from] Marine Harvest [Canada, a salmon-farming company operating in the province] for some of

the ship time, and some work from the Salmon Foundation, Dr. Riddell's group.

So in each of these years, we have done large-scale surveys of sockeye salmon throughout the Strait of Georgia at up to 70 to 80 different sites ranging from the mouth of the Fraser River right to through Johnstone Strait. We've also collected fish in 2010 at the mouth of Chilko Lake where we take advantage of the fact that there's a counting fence that we can actually obtain samples. And this year in 2011 we also added sampling of fish in the lower river, just immediately before they leave the strait.

And on these fish they're receiving a complete health assessment. [In] 2011 we've included things such as water chemistry ... [and] toxic phytoplankton sampling with associated surveys ... Dr. Garver is doing the virology work and we're using recognized and validated diagnostic tests, as well as a lot of histopathology[.]¹⁰³

The sockeye health assessment occurs under a broader salmon survey, funded under the Program for Aquaculture Regulatory Research (PARR), which is described in Chapter 8, Salmon farm management. The goals of the survey are as follows:

To conduct a 3 year program to address the following questions for wild juvenile salmon of Fraser River origin:

- Which species of sea lice are found on juvenile salmonids and how abundant are they?
- When and where do juvenile salmon become infected with sea lice and how does the level of infection change over time?
- What role/s if any do farmed salmon play in the infection of juvenile wild salmon with sea lice?
- What role/s do wild host (salmonid and non-salmonid species) play in the infection of juvenile wild salmonids?¹⁰⁴

The work is being conducted in partnership with Marine Harvest Canada and the Pacific Salmon Foundation.¹⁰⁵ In 2010, the program sampled fish in the Strait of Georgia and Johnstone Strait. Approximately 1,000 sockeye were collected in 2010. Those samples were processed for histology,

virology (for IHN, VHS, and ISA), and bacteriology (for bacterial kidney disease [BKD]), as well as sea lice and molecular diagnostics.¹⁰⁶ The results of the testing with respect to ISAv are discussed in the case study at the end of this chapter.

Draft CFIA surveillance plan for ISA, IHN, and IPN viruses

In the fall of 2011, CFIA developed a draft plan called "Surveillance Plan for ISAV, IPNV, and IHN" (draft surveillance plan).¹⁰⁷ Under the *Health of Animals Act* and the NAAHP, "[t]here [have] always been plans to put in surveillance programs for all ... the commodities," Dr. Klotins noted.¹⁰⁸ She explained that, while these plans were in the works, the time frame for developing a surveillance program for the health of Pacific salmon was moved up in the fall of 2011 in response to presumptive positive test results for ISAv in Pacific salmon from non-NAAHLS laboratories.¹⁰⁹ She said CFIA prepared the draft surveillance plan in part to satisfy Canada's trading partners – to provide them with information about the "health status of finfish in B.C." and to demonstrate to them that BC fish are free from disease.¹¹⁰ In explaining why a health surveillance program for wild fish was not in place sooner, Dr. Klotins said this:

It hadn't been done up until this point because we needed to secure the resourcing to move ahead with the surveillance program, and in addition we had to work with industry to find out basically what was being done on the cultured side, identify the gaps, and then identify what we needed to do on the wild side. It was already in progress. It's just this event happened to push things forward because our countries [that we trade with] are starting to ask for our claims of disease freedom, and our supporting information for those claims.¹¹¹

At the time of the ISAv hearings in December 2011, CFIA had put the draft surveillance plan through internal review and had received comments on it from DFO. CFIA intended to start a broader consultation on the draft plan in January 2012 and begin implementing the plan "towards the late Spring in 2012."¹¹² Dr. Klotins expected the

plan to undergo several more revisions before it was ready to implement.¹¹³

The draft surveillance plan's goal is "to effectively determine the absence or presence of three diseases of significance in both cultured and wild marine anadromous fish populations off the west coast of Canada," the three diseases being ISA, IPN, and IHN, all of which are reportable diseases.¹¹⁴ CFIA intends the evidence garnered through surveillance to "[p]rovide support for the protection of aquatic resources," "[s]upport international trade negotiations," and "[s]upport the risk-based compartmentalization program."¹¹⁵

A briefing note to the minister of agriculture and agri-food describes the surveillance plan in part as follows:

Surveillance for cultured and wild species will be conducted differently and evaluated separately, given that industry has already put in place a surveillance program for cultured species. The CFIA's preliminary review of this industry-led testing program shows that there has been a significant amount of testing for viral disease, including ISAV, in cultured fish over the last 10 years. It is proposed that the CFIA play an oversight role for the surveillance of cultured species, given the existing surveillance industry program.

For wild species, more work will be required. Based on the recommendation of the draft surveillance plan, about 3850 fish samples per year for the two first consecutive years would be collected. After this initial effort, it is recommended to continue collecting but at a reduced level. To be noted, this is the first instance of CFIA-led active surveillance effort for finfish in B.C. since the creation of the National Aquatic Animal Health Program. However, DFO has undertaken some surveillance initiatives in wild fish in the past.

The total cost to CFIA for this work is about \$350,000 over two years, which covers the operational requirements, except for the testing, which is the responsibility of DFO's NAAHLS. After this period, there will be significantly lower ongoing costs that will need to be determined based upon the implementation of the surveillance plan and the findings. These costs will be covered internally by reallocation. DFO will be responsible to cover the costs related to the testing under the surveillance plan.¹¹⁶

Other exploratory research on Fraser River sockeye health

Dr. Miller and the Molecular Genetics Section at DFO have used molecular techniques and functional genomics to study fish diseases. Her approach involves looking at the pathogen loads in fish and then comparing them to the degree of host response at a genetic level. Her method provides a way to "rank which, among the various pathogens, [that salmon] carry might be causing harm."¹¹⁷ It is a novel approach. The microarray data that she has for over 3,000 fish enable her to do retrospective genomics. When new data (such as discovery of a new virus) become available for a fish sample, they can be compared to the microarray data already on file for that fish sample.¹¹⁸ Dr. Miller testified that she believes "we can add a layer to our knowledge of fish disease and wild fish by using the genomic, and by using the microarray data that we already have."¹¹⁹

Dr. Miller testified twice before me, during the disease hearings in August 2011 and during the ISAv hearings in December 2011. Both times, she indicated there is resistance from the Aquatic Animal Health Section to her genomics work. During the disease hearings she commented about working with her colleagues in the Fish Health Group in relation to the mortality-related signature (MRS) she has identified (see discussion of the MRS in Volume 2). She said that the Fish Health Group was "not comfortable in continuing on or paying a lot of attention to this until we actually had a virus ... [T]here was a lot of reluctance to take any action based on a genomic signature, because people don't understand what is a genomic signature, and how well can you actually predict a mechanism from one."¹²⁰ Dr. Miller said that in July 2011, the Fish Health Group was uncomfortable approaching the salmon-farming industry for samples to test for the parvovirus which had, by that time, been identified in many of the MRS-positive fish.¹²¹ However, in July 2011, Andrew Thomson, director, Aquaculture Management Directorate, Pacific Region, approached the farms, and they agreed to have their fish tested.¹²² In December 2011, Dr. Miller testified that, shortly after she testified in August, she and Mary Ellen Walling, executive director of the B.C. Salmon Farmers Association, disagreed on when

and how Atlantic salmon would be tested, with the result being that Dr. Miller no longer had an agreement with the salmon-farming industry to obtain Atlantic salmon samples to test for parvovirus.¹²³

During the ISAv hearings, Dr. Miller remarked that there is a difference in “philosophical approach” between her laboratory and the Fish Health Group: “Their approach is to make sure [a disease is] not there. My approach is to ask if there’s any way that it is there.”¹²⁴ She further testified that, in her view, research on disease in wild BC salmon needs to go further than the viruses currently known to exist, and needs to be explored using alternative methods.

She said that she is working in an area of fish diseases that can generate a lot of data relatively quickly and in a novel way. It can take managers by surprise:

We can run 30 pathogens in 200 fish in a day, quantitatively. And so there’s a lot of power in the level of information one can get very quickly, and I’m learning that for managers, having new information all the time is not necessarily a good thing because they don’t have time to adapt to that.¹²⁵

During the ISAv hearings, Dr. Miller reported that she had recently (as of December 2011) identified the piscine reovirus, the virus that is thought to cause heart and skeletal muscle inflammation (HSMI), in wild migrating sockeye salmon.* She had also identified it in farmed chinook salmon.¹²⁶ Dr. Arne Nylund, a professor in fish health diseases from the University of Bergen, Norway, testified that HSMI is a significant disease of concern for fish farms in Norway, causing significant losses and morbidity and reducing the quality of the fish.¹²⁷ Although Dr. Miller noted that her finding was still “research in progress,”¹²⁸ it serves to emphasize her point that DFO researchers do not know the scope of what diseases and pathogens are carried by wild salmon like sockeye. They need to be open to new techniques that can explore this question and not place all their focus on regulated diseases.

■ Fish health management at salmon farms

As discussed further in Volume 2 of this Report, Dr. Kent testified about how salmon farms could impact wild fish such as Fraser River sockeye by introducing new exotic diseases to wild fish or by making endemic diseases worse by amplifying the pathogens.¹²⁹ The densities of fish held in net pens “would play a [negative] role in directly transmitted diseases,” although other factors about salmon farms are more positive, such as the opportunity to vaccinate and remove sick and dead fish from the net pens.¹³⁰ Dr. Kent said that, during a disease outbreak, it would be reasonable to assume that the numbers of pathogens in and around salmon farm net pens are increased. However, whether this would increase exposure and infection in wild fish is still “an important question that has to be answered for most diseases.”¹³¹

All the researchers of Technical Report 5, Salmon Farms (Dr. Lawrence Dill, Dr. Donald Noakes, Dr. Brendan Connors, and Dr. Josh Korman), agreed that, if fish farms are point sources of diseases, then pathogens should be discoverable on farms, and therefore record keeping and fish health management procedures are the key to guard against transferring pathogens to wild fish.¹³² All four researchers also agreed that “if managed properly” aquaculture and wild fish can coexist.¹³³ However, I am not sure that the four had a common understanding of what constitutes “proper management.”

In addition, each witness who testified on a panel addressing fish health management issues during the aquaculture hearings in August 2011 – Dr. Gary Marty, fish pathologist at BC’s Animal Health Centre; Dr. Mark Sheppard, lead veterinarian in DFO’s Aquaculture Environmental Operations (AEO); Dr. McKenzie; and Mr. Swerdfager – agreed that the risk posed to wild salmon from disease at salmon farms is manageable with “appropriate care and attention.”¹³⁴ Again, I am not sure that the four had a common understanding of what constitutes “appropriate care and attention.”

* On April 23, 2012, I received an application from one participant in this Inquiry, the Aquaculture Coalition, to reopen hearings to receive evidence on the epidemiology and impacts of piscine reovirus and HSMI in salmon in British Columbia. I dismissed that application in a ruling released May 16, 2012.

No regulation dictates how much or how little disease is allowed in a population of farmed fish,¹³⁵ and conditions of licence do not prohibit the presence of pathogens on salmon farms.¹³⁶ Further, no special rules or regulations with respect to fish health apply to salmon farms on the migratory pathway of wild salmon.¹³⁷

Mr. Gavin Last, assistant director of the province's Policy and Industry Competitiveness Branch (responsible for aquaculture program administration), confirmed there has never been a year when there were not disease and pathogens present on BC fish farms. As under the current federal regulations, he was not aware of anything in the previous provincial licensing regime that could prevent diseases from occurring on fish farms.¹³⁸

The Wild Salmon Policy recognizes that salmon farms pose risks to wild salmon, including the chance of disease and parasite transfer. It says these risks are addressed through Fish Health Management Plans (FHMPs, discussed below), improved cage structures, and proper farm siting.¹³⁹

Federal conditions of licence and approach to fish health on salmon farms

The 2010 federal conditions of licence for salmon farms set out the measures, notices, records, and reports that licence holders must employ related to fish health at sections 5–9, and 14, and appendices IV, V, VI, VII, and VIII.¹⁴⁰

DFO has developed a draft "Approach to Fish Health"¹⁴¹ to guide the Fish Health Management Program for salmon farms. It does not "put forward a fish health approach for all organisms in the sea."¹⁴² DFO's draft "Approach to Fish Health" sets out its approach to managing fish health at salmon farm facilities as follows:

- Keeping fish healthy by minimizing disease and spread of disease within and between sites through adequate hygiene and disinfection procedures, biosecurity measures, minimal fish

handling, adequate escape prevention measures, use of vaccines, disease screening of broodstock and cultured fish prior to transport / harvest, and treatment of pests and pathogens as directed by a licensed aquatic animal health veterinarian.

- Monitoring fish health by routine visual assessments to observe unusual behaviour, lesions, or other signs of disease, and routine sampling and examination "upon the instructions of the operator or Veterinarian / fish health professional or at the direction of Fish Health Management."
- Responding appropriately to different types of fish health events (FHEs)*:
 - Non-disease-related mortality events should result in implementation of a response plan involving mitigation measures of physical factors.
 - A disease requiring treatment – but which does not pose an emergency or serious concern of outbreak – requires a fish health report.
 - An endemic disease of serious concern for a potential outbreak must be immediately reported as a fish health emergency.
 - A non-endemic disease of serious concern for a potential outbreak must immediately be reported to CFIA and DFO.
- Recording and reporting fish health data. Regular record keeping at a farm should include "chronological records of disease history and management, patterns of morbidity and mortality, actions taken to prevent, control and treat disease, movements of fish within facility, and health risk factors specific to the site or the affected group of fish." Licence holders must report fish health data to DFO on a regular basis as set out in conditions of licence, as well as making reports on an emergency basis of outbreaks of a significant disease.
- Developing and using Fish Health Management Plans that identify the types of actions and procedures that licence holders must use at a facility, as set out in Appendix V of the conditions of licence.¹⁴³

* An FHE "is defined as an active disease occurrence or a suspected infectious event on a farm that triggers: 1) veterinary involvement and 2) an action, such as: lab diagnosis, recommendations / report, husbandry change, prescription medication, further investigation, etc. where such action is intended to reduce or mitigate risk associated with that event" (Exhibit 1560, p. 5).

Roles and responsibilities

Although DFO has the main regulatory role for salmon farms in British Columbia, it does not have the only role in relation to fish health. DFO's Aquaculture Environmental Operations staff conduct audits and monitoring of fish health data from salmon farms; the salmon-farming companies all employ veterinarians to look after the health care of their fish; the province has a diagnostic laboratory which both industry and DFO's fish health audit program hire to perform diagnostic tests on cultured fish; and CFIA investigates notifications of reportable and immediately notifiable diseases. These various roles are discussed below.

DFO's AEO biologists and veterinarians

AEO staff include biologists and veterinarians who assess aquaculture projects, conduct audits, and monitor fish health.¹⁴⁴ A Fish Health Unit, responsible for sea lice and fish health monitoring, is located within AEO and headed by the lead veterinarian, Dr. Sheppard.¹⁴⁵ Dr. Sheppard came to DFO after three years as the aquatic animal health veterinarian with the province, overseeing the former provincial Fish Health Program.¹⁴⁶ He testified that his work with the provincial program has largely been carried over into his work with DFO.¹⁴⁷

DFO's Fish Health Surveillance Program for salmon farms, conducted by AEO staff, is discussed further below.

Salmon farm company veterinarians

The role of a fish health veterinarian is to work with the farmers to ensure their stocks are healthy and that appropriate husbandry is being provided for the fish, and to examine any ill fish to determine the appropriate action.¹⁴⁸ Dr. McKenzie, veterinarian and fish health manager for Mainstream Canada,¹⁴⁹ explained his function as a company veterinarian. He described the role of a fish farm veterinarian as being quite broad, including "everything from egg to plate, as we say." He said he manages all areas of fish health within the company, which includes the company's genetics program, monitoring brood fish, maintaining eggs and juvenile fish in top physical health, and monitoring, controlling, and

managing disease throughout the production cycle in both fresh- and saltwater.¹⁵⁰

Dr. McKenzie said that company veterinarians try to manage salmon farms on an area basis: "[W]e always have to manage disease in a very holistic perspective," and must be "conscious of diseases that are found in the wild stocks." He said his team looks at interactions in the environment, migratory pathways, and any changes in the environment which may affect the company's production strategies. The team is in close communication with other farms in the area, he said, which allows it to better understand any changes happening in the environment.¹⁵¹ Further, Dr. McKenzie said he relies on others, such as Dr. Marty, to provide information about the fish on his company's farms to add to his own clinical on-site experience.¹⁵²

The veterinary profession in British Columbia is governed by a code of ethics and conduct.¹⁵³ Sometimes salmon farm veterinarians are faced with treating farmed fish in situations that are not medically necessary. Dr. McKenzie testified that, in his view, some of the management responses imposed by government are not needed for the health of fish on the farm. Rather, they are intended to serve the interest of healthy wild stocks. He described what he called a "conflict for me," when treatment for sea lice is administered to farmed fish as a precaution for wild fish, even when "lice levels are incredibly low on farms," and the treatment is not medically necessary. He also spoke about the IHN outbreak on salmon farms in 2003, during which he recommended culling farmed salmon because of a risk to wild salmon. The cull was "very contrary to the business model of the company," given that mortalities on the farm were not that high, but his advice was accepted by the company.¹⁵⁴

Provincial diagnostic laboratory

The Animal Health Centre (BC Lab) in Abbotsford is a fee-for-service provincial veterinarian diagnostic laboratory for all species of animals. Dr. Marty said he is "specifically charged to work with fish" and is responsible for any "final case send off" on any fish analyzed by the laboratory.¹⁵⁵ He explained that he has the ability to provide a diagnosis and prepare a report based on observing tissue under a microscope, whereas Dr. Sheppard and Dr. McKenzie are

trained to read his report and interpret the results along with their clinical findings.¹⁵⁶

The BC Lab receives samples of farmed fish from official government audit or monitoring programs (see discussion below) and directly from fish farmers, either when tests are requested by veterinarians because of specific health concerns, or when a farm does a health screen of fish prior to transferring them.¹⁵⁷ Technicians conduct bacteriology and PCR (polymerase chain reaction) tests as requested, and Dr. Marty himself does the histopathology (the study of disease at the cellular level). Dr. Marty brings “all these different diagnostic modalities” together in a single case report, which includes background information, and will often provide a diagnosis. These reports go either to the veterinarian in the field (such as Dr. McKenzie) or to the regulatory veterinarian (Dr. Sheppard).¹⁵⁸ These veterinarians use Dr. Marty’s results to assess whether diseases exist in the field.¹⁵⁹

Dr. Marty testified that part of his role as a pathologist is to provide information to his clients. As an example of this, he explained that, given the public interest and concern about the potential for ISA to come into British Columbia, in cases where he sees symptoms that have been associated with ISA infection, he will include a standard comment, which says “sinusoidal congestion ... is a classic lesion associated with ISAV.” He notes that he follows this with a clause “‘but ISAV has not been’ – ‘never been identified in British Columbia.’” He said this is simply a statement of fact to provide clients with information.¹⁶⁰

Canadian Food Inspection Agency

As described above, CFIA becomes involved in fish health management issues at a salmon farm if there is an outbreak, detection, or suspicion of a reportable disease, such as ISA or IHN. When a disease is in the “suspect phase” depicted in Figure 1.9.1 (above), CFIA inspectors will determine whether inspection of the premises is necessary. In the inspection phase, CFIA inspectors will attempt to determine the health status of the premises; implement any movement controls or make quarantine orders; send samples of fish to laboratories for diagnostic testing; complete a CFIA report called an AquaPiQ; and discuss the expected response and timelines with the salmon farm operator. During the “decision phase,” CFIA

will consider whether to implement emergency response measures. Then, in the “action phase,” CFIA will implement any emergency responses. Emergency responses might include biosecurity, movement control, evaluating the market value of the animals in question, destroying infected animals, disposing of carcasses, cleaning and disinfection, vaccination or treatment of animals, epidemiology and tracing, or surveillance and diagnostics.¹⁶¹

Fish Health Management Plans

Fish Health Management Plans set out processes for managing diseases and pathogens on salmon farms, but they do not prohibit diseases.¹⁶² Susan Farlinger, regional director general, DFO Pacific Region, testified that despite FHMPs, diseases still occur in the salmon farms.¹⁶³ FHMPs “set out a strategy or application to deal with fish health problems when they arise in order to control or eradicate them.”¹⁶⁴ Ms. Farlinger said the FHMPs for aquaculture finfish focus on three things: “human health and health of the fish that are growing in the pen and, thirdly, the path of the environment in which they operate.”¹⁶⁵ In contrast, she said FHMPs for enhancement facilities (discussed below) focus less on human health; “the focus is more on the impact, on potential impact on wild stocks, either genetically or from a biodiversity perspective.”¹⁶⁶

In 2003, FHMPs became a condition of licence under the provincial regulatory regime for aquaculture.¹⁶⁷ At the time of the hearings on salmon farms in August and September 2011, Mr. Swerdfager told me that DFO also intends FHMPs to become a condition of federal salmon farm licences, beginning in December 2011. He said FHMPs were not made a condition of licence during the first year of the federal regulatory program because, in December 2010, the templates for the federal FHMP were not complete. He said part of Dr. Sheppard’s work is to design the structure and content of the required FHMPs.¹⁶⁸

Dr. Sheppard testified that FHMPs can be broken down into two components: fundamental guiding principles and standard operating procedures. An example of a principle might be “collection of your carcasses on a regular and routine basis.” The standard operating procedure for how that is done

might vary from site to site within a company, and those procedures could be reviewed and revised by the company on a regular basis. The conditions of licence require salmon farmers to submit any revisions to the standard operating procedures to DFO annually. Although companies may revise their standard operating procedures, they are not able to change the fundamental principles of the FHMP.¹⁶⁹ As of August 2011, Dr. Sheppard was in the process of updating the required elements and templates used under the prior provincial regime,¹⁷⁰ after which companies will have to update their previous FHMPs to comply with the new federal templates.

Providing an industry perspective, Dr. McKenzie testified that the FHMP is “sort of the Bible for our production system” in that it dictates “how we do business to ensure that our fish are kept in optimum fish health.” He said it is his job as a company veterinarian to ensure that the FHMP is accurate, up to date with evolving science and emerging concerns, and fully implemented.¹⁷¹ His company uses

its FHMP as a “guidance document” for his team’s management of day-to-day activities.¹⁷²

Fish health monitoring

In chapters 7, Enforcement, and 8, Salmon farm management, I discussed monitoring, compliance, and enforcement in relation to salmon farms. In this section, I discuss monitoring and compliance activities that relate specifically to fish health issues. Since the federal program is premised on the previous provincial program, I begin with a discussion of the latter. Under both the previous provincial and the current federal program, BC coastal waters have been divided for the purposes of monitoring and reporting into “fish health zones” and “sub-zones” that are “loosely based on watersheds” and “follow natural geographical divisions of the aquaculture industry.”¹⁷³ Figure 1.9.3 depicts these fish health management zones.

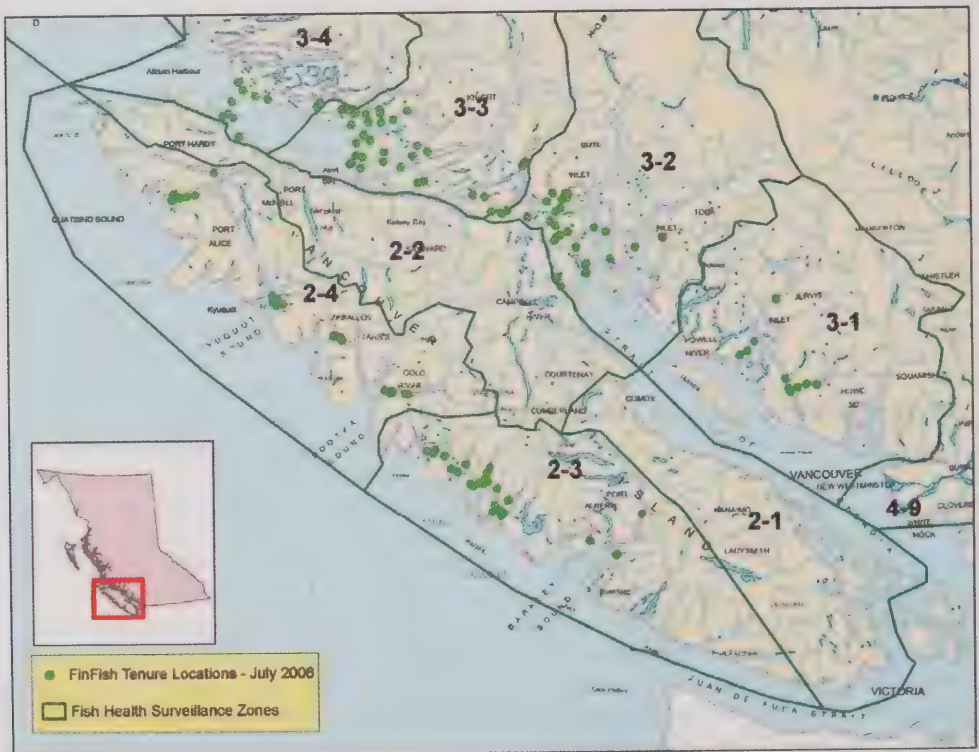


Figure 1.9.3 Fish health management zones

Source: Exhibit 1594, Appendix VI, p. 31.

Previous provincial fish health audit and surveillance program

The province implemented a salmon health management program in the early 2000s. It comprised “on-farm health management plans [that is, the FHMPs], mandatory monitoring and reporting of disease events, and a BC MAL [BC Ministry of Agriculture and Lands*] audit of industry-reported information.”¹⁷⁴

On-site monitoring and reporting was a requirement of FHMPs under the provincial regime.¹⁷⁵ All commercial salmon aquaculture facilities, in both fresh and saltwater, reported “site-specific information” to the industry database of the B.C. Salmon Farmers Association (BCSFA) on a monthly basis, including all mortality, causes of mortality, and FHEs.¹⁷⁶ The BCSFA then submitted quarterly reports of these data to BCMAL.

BCMAL posted the quarterly reports of fish health data as well as its annual Fish Health Reports on the provincial Animal Health Branch’s website. BCMAL also required fish farms to conduct sea lice assessments on active Atlantic salmon farms “on a monthly basis and report the monthly data (in an aggregated form) from each sub-zone.”¹⁷⁷

At the request of BCMAL, in 2006, the Centre for Coastal Health, a private non-profit research organization, conducted a review of the BC Fish Health Audit and Surveillance Program (FHASP).¹⁷⁸ The review praised the program:

The data collected as part of the BC FHASP exceed international standards to demonstrate freedom of disease and the level of fish health monitoring in BC is more comprehensive than in other parts of Canada and other salmon producing regions of the world. Maintenance of the current program, with minor adjustments, will go a long way towards maintaining Canada’s international reputation for disease freedom and control.¹⁷⁹

Dr. Craig Stephen, director of the Centre for Coastal Health and professor in the Faculty of Veterinary Medicine, University of Calgary, testified that the program covered a “significant number of

animals. We look at some of our ongoing screening for endemic problems or food safety issues that might be done federally[;] this is a larger sample size than you’ll see in a lot of other ongoing monitoring programs.”¹⁸⁰

During the transition from provincial to federal regulation, there was a period of approximately one year when the provincial government had stopped auditing self-reported fish health data and the DFO’s licences and program had not yet come into effect. During this period, the Centre for Aquatic Health Sciences, a non-profit society based in Campbell River, conducted audits of the fish farms and posted this information on its website.¹⁸¹

Federal fish health surveillance program for salmon farms

As described in Chapter 8, Salmon farm management, the federal monitoring regime for salmon farms is based on industry self-reporting and government audits. The self-reported information is set out in Chapter 8; the audit and surveillance function related to fish health is described here.

Dr. Sheppard testified that, at the beginning of each calendar quarter, 30 farms are selected for audit. He said DFO’s goal is to visit active farms 150 to 160 times each year: 120 farms for a fish health audit and surveillance, and about 40 for a sea lice audit.¹⁸² Audits include collection of samples for diagnostic work.

AEO staff use a standard checklist for their audits: the DFO health management and mortality management plan inspection.¹⁸³ They use the checklist to ask farm managers a series of questions, look through records, and conduct a walkabout of the farm.¹⁸⁴ Dr. Sheppard said that DFO’s fish health technicians also have “several other field sheets” on which “we document much of the same information which comes back with the actual fish tissues and is incorporated into the fish health database.” He said that is the information that is largely used “in conjunction with all other bits of evidence from the pathologist and the laboratory results to help make our [farm level] diagnosis.”¹⁸⁵ (See the discussion of diagnoses below.)

* Although BCMAL is no longer a current ministry, I use this acronym for consistency with documents and testimonial evidence. See discussion of BC ministries in Chapter 8, Salmon farm management.

Dr. Sheppard testified that the “Audit and Surveillance Program is very precautionary in following the requirements and expectations of the international community, the World Organisation for Animal Health, the OIE.”¹⁸⁶

Dr. Marty testified about the testing performed on audit fish at the BC Lab. He said that all fish collected by the audit staff are tested, but “sometimes we’ll pool fish up to five fish per pool, for the test, and that’s an international standard.” Dr. Marty said he tests for the endemic diseases VHS and IHN, and the exotic diseases IPN and ISA. He also tests for *Piscirickettsia salmonis* bacteria, which is sometimes found in fish in British Columbia.¹⁸⁷

Dr. Marty said the number of fish required for testing depends on the goal for the study. For example, he said, to certify to OIE standards that a specific lot of fish is disease-free:

[W]e always ran 150 ... The audit program is quite different ... the goal of that program is to audit the fish health events that are reported by industry. So we are not attempting to certify any individual farm free from disease.

...

[W]e get about 150 fish a quarter[;] our epidemiologists tell us that we can actually add those up, and because it’s a randomized sample, we’re sampling fish that are the most likely to be diseased, so at the end of the quarter we have 150 fish, [and] if they are all free of, say, ISA, we can then state with a level of confidence that we have 95 percent confidence that the prevalence of ISAV in our population, our British Columbia fish, is less than two percent.¹⁸⁸

Disease diagnoses on fish farms

Disease diagnoses can be made at the level of an individual fish (such as what Dr. Marty does when he makes a diagnosis based on laboratory reports and histology of specific fish), or a farm level. Dr. McKenzie testified to farm-level diagnoses made by a company veterinarian. He said that every time a veterinarian investigates a problem, he or she looks at the history of conditions that

might have created a probability of disease, the behaviour of the fish and any changes in behaviour or in mortality, the appearance of the fish themselves including necropsies,* and any laboratory information. Then, the veterinarian makes a “differential diagnosis”; that is, he or she uses the information gathered to knock unlikely diagnoses off the list. Dr. McKenzie stressed that “[i]t’s not a single test” informing a diagnosis.¹⁸⁹

Dr. Sheppard described the process for making a “farm level diagnosis” as a government regulator:

We need to compile all of the information collected not only from the farm, the interviews with the staff, the information on the field sheets, all these different tools we use in terms of, if you’ll allow me, evidence, right through to what Dr. Marty will present as his diagnosis on a cellular level and a tissue level and an individual fish level, we use all that as tools and we compile all that in an epidemiological approach to look at all the factors to determine not what is the diagnosis in that individual fish, in other words, a lab result or a histopathology result, but what is the diagnosis at the farm level, at the population level, where the audit was conducted.

...

So as an example, we may collect 10 fresh carcasses at a farm. One of them may have indications of pathology as described by Dr. Marty. Then my job would be to look at, is that relevant to the main population when the mortality rate is low, there have been no treatments required, no fish health events, the attending veterinarian is very aware of what’s going on and is taking no action. So I would tend to not call that a disease-level problem at that farm. I would consider it one fish, one sample, it’s a lab result.¹⁹⁰

Dr. Sheppard said that it “can occur quite regularly” that one or two individual fish might be found to have a disease, but there are no diagnoses of disease at a farm level. Those cases are listed as “open” diagnoses on a farm level. The Supplemental Appendices to the 2009 Annual Report of the BC Fish Health Program explain how and why the provincial veterinarian (then Dr. Sheppard) would come to an “open” diagnosis at the population level.¹⁹¹

* A necropsy is an examination of the dead (Transcript, Dr. Gary Marty, August 31, 2011, p. 16).

Open diagnosis: The information collected and observations made during an audit are often inconsistent with the results of laboratory tests, or the test results of the samples submitted reflect a mixed etiology [*sic*], or no pathogen observed. Often insufficient evidence exists to suggest population involvement of a specific disease (i.e. there is a low mortality rate and few silvers [freshly dead fish] are available). In these cases, one must conclude that either the cause of death remains unknown or the mortality observed is incidental and not sufficient to assign a farm-wide disease diagnosis.¹⁹²

Dr. Sheppard said that, as soon as the AEO Fish Health Unit makes a finding, it is communicated to the attending veterinarian to ensure that any known issues are addressed.¹⁹³ In the case of an open farm-level diagnosis, it does not mean that there is no disease on the farm, only that there is no “consistent disease across the farm.” “We would call it an open diagnosis because we are unable to conclude why those fish, the silvers that we collected that day, may have ended up in the dead pile.”¹⁹⁴ Also, the presence of indigenous pathogens in a fish does not mean that the fish died of that disease. As an example, Dr. Sheppard said that many people in the courtroom where he was testifying likely had the bacteria *Staphylococcus* on their skin, yet they did not have flesh-eating disease.¹⁹⁵ Further, Dr. McKenzie explained that “there is a natural background disease level that we will see, and just like any salmonid species in the same waterway, we would see at some level those diseases: whether it’s an outbreak, no; presence of a pathogen, yes.”¹⁹⁶

Concern surfaced during the hearings about the diagnoses done at a farm level. More specifically, the authors of technical reports 5A, 5B, 5C, and 5D, Salmon Farms, relied on data in BCMAL’s fish health databases as the basis for their conclusions about the impact of disease and pathogens from salmon farms on the health of Fraser River sockeye, possibly assuming that an “open” diagnosis meant that no disease was present on a particular farm. Dr. Korman, author of Technical Report 5A, Salmon Farms and Sockeye Information, the project that summarized the data provided by the province, Canada, and the BCSFA for use by the other Technical Report 5 authors,

testified that his analysis proceeded on the basis of farm-level data, not individual fish.¹⁹⁷ With reference to the farm-level diagnoses spreadsheet from the BCMAL fish health audits,¹⁹⁸ Dr. Korman testified that the “open” farm diagnoses comprise over 50 percent – even as much as 60 percent – of all audits.¹⁹⁹ In Dr. Korman’s analysis, he treated farms with an open diagnosis as if they were healthy farms.²⁰⁰ Dr. Korman agreed with a suggestion from one participant’s counsel that, if up to 60 percent of the farm diagnoses are “open,” then it would be “statistically valuable” to know “if there was a rise in one or more symptoms over time,” and that such a rise in symptoms would suggest further inquiry was needed.²⁰¹

Egg importation

Dr. McKenzie described the steps that a fish farm company formerly had to go through if it wanted to import salmon eggs into Canada from another country. I understand that the regulatory regime has changed as of December 2011, with amendments to the FHPR and consequent movement of responsibility for international imports from DFO to CFIA under the *Health of Animals Act* (see discussion above). Still, the process described by Dr. McKenzie was the state of play at the time of the hearings about salmon farms in August 2011 and describes past egg importations to salmon-farming operations in the province.

Dr. McKenzie testified that a company would make an application to import eggs to DFO. The Introductions and Transfers Committee (discussed above) and the local fish health officer would ensure that the applicant was able to meet the criteria under the FHPR (as they were then), such as obtaining eggs from a quarantine facility. DFO would provide an import contract to the company, laying out the conditions of testing, quarantine, release, and communications with DFO. The company would put the eggs into quarantine where they would undergo a series of tests, usually once per month. After a DFO-approved laboratory provided satisfactory test results to DFO, DFO would release the eggs from quarantine, but the company would still keep them in separate facilities. The fish grown from the eggs would then be tested and tracked as an individual group, even in saltwater.²⁰² Dr. McKenzie said that, in

particular, ISA was listed as a disease that companies were required to test for on their import contracts. He said that the company he works for, Mainstream Canada, tests for ISA six or seven times prior to release, using PCR methods. It has never found ISA in that testing.²⁰³

Mr. Swerdfager testified about DFO's system for reviewing egg import applications: "[T]he system is not just simply a rubber stamp." He said that, although DFO has not had cause to refuse imports of eggs to British Columbia, it has done so in Nova Scotia.²⁰⁴ Mr. Swerdfager also noted that egg importation is "not an area where there's a lot of activity."²⁰⁵

Dr. Kent characterized DFO's program for egg importation as a "very rigorous program."²⁰⁶ He said an "eggs only" policy "dramatically" reduces the opportunity for the introduction of an exotic pathogen into the province.²⁰⁷ More specifically, the importation and quarantine programs used in British Columbia have reduced the risk of importing exotic diseases through egg transfer.²⁰⁸ Dr. Kent agreed with the opinion of Dr. Larry Hammell, expressed in a report that Dr. Hammell prepared for the BCSFA:

Three important aspects of the egg importation reduce the probability of pathogen introduction from low to extremely low. These are 1) taking eggs from FHPR approved sources, 2) restricting movement of live animals to the eyed egg stage, and 3) post-transfer quarantine with extensive diagnostic testing requirements. These actions are directed toward identifying stock that could be infected with an exotic pathogen and containing that infection if it occurred. It appears to be successful at least to the point of not identifying any exotic pathogens through the process to that stage of release from quarantine.²⁰⁹

A document in evidence written by Alexandra Morton, executive director of Raincoast Research Society, expresses concerns that egg importations have proceeded despite concerns both within and outside DFO over the potential to import exotic diseases.²¹⁰ While I accept such concerns exist, the evidence before me from Dr. McKenzie, Mr. Swerdfager, and Dr. Kent indicates that DFO has taken appropriate steps to deal with them.

Management options to reduce risks to wild salmon

Witnesses discussed several different options for reducing risks of disease and pathogen transfer from salmon farms to Fraser River sockeye, ranging from good fish husbandry practices to keep farmed fish healthy to closed containment systems that prevent sharing of water between wild and farmed fish. Central to this discussion is the concept of "biosecurity."

Dr. Dill, author of Technical Report 5D, Dill Salmon Farms Investigation (see discussion in Volume 2), told me that biosecurity refers to the measures taken to prevent "the movement of disease from farm to farm" whether steps are taken at a local, regional, or international level.²¹¹ Dr. McKenzie said that "biosecurity is a paramount piece in fish health management in all aspects, whether it be in hatcheries or in fish farms."²¹²

Dr. Christine MacWilliams, veterinarian in DFO's Aquatic Animal Health Section, described the "principles of biosecurity" in relation to captive fish:

[T]here ... [are] three main tenets and one is that you want to keep pathogens out of your facility, one is if they do happen to get in, then you want to prevent them from spreading, and the third is the efforts that you ... [make] to keep your population as healthy as possible and reduce their susceptibility to the pathogens having a deleterious effect.²¹³

Dr. Garver told me that biosecurity is "one of the first and foremost things that you implement ... if you know what the disease agent is and how to prevent it, and to eliminate its spread," but that "it's really hard without a specific pathogen to recommend methods to eliminate it without knowing the biology behind each pathogen."²¹⁴ And Dr. Johnson told me that the risk posed to Fraser River sockeye from captive fish is related to the biosecurity of a particular facility.²¹⁵

Ms. Morton said the concept of biosecurity on a fish farm is confusing given that "the reason that they use the nets is so that millions of gallons of water will pass through the farm from inside to the outside."²¹⁶ Catherine Stewart, salmon-farming campaign manager, Living Oceans Society, agreed with Ms. Morton, saying: "You can't secure, biologically, an open net pen that relies on tidal flushing and the free flow of water. There's no securing possible."²¹⁷

Disease control options

Dr. McKenzie described different measures taken by salmon farmers to ensure that stock in their pens remain healthy throughout their lives:

- Control broodstock to “start off with good, healthy stocks,” including having a genetics program.
- Produce eggs in “a manner that is sanitary” and adheres to strict biosecurity standards.
- Maintain a good rearing environment and a good nutritional environment for fish.
- Use dip vaccines when the fish are 3 grams to help them fight off disease.
- Disinfect water coming into the hatchery.
- Take biosecurity very seriously “to ensure we’re not moving high risk people, equipment, animals, into and between hatcheries.”
- Monitor fish on a daily basis. Early detection and constant monitoring is key.
- Treat or cull fish as necessary.
- Use injectable vaccines on every fish prior to release to saltwater.
- Test the fish for optimal smoltification before moving them to saltwater.

- Once in saltwater, make daily observation and monitoring, including daily necropsies.
- Investigate any issues and involve veterinarians for treatment.
- Do regular health screening for health issues that might not be visible.²¹⁸

Dr. McKenzie said the above elements of good fish husbandry are set out in a company’s FHMP.²¹⁹

In 2009, the Salmon Aquaculture Dialogue, a multi-stakeholder, multi-national group initiated by the World Wildlife Fund, commissioned a report on salmon diseases.²²⁰ That report set out “basic categories of methods for disease control” as shown in Table 1.9.1. Mia Parker, an industry representative formerly with Grieg Seafood BC Ltd., said these categories of actions are listed in “order of severity” and that the bottom five (including “no action”) are part of daily practice on a salmon farm.²²¹ In respect of the “test and slaughter” category, Ms. Parker said that in British Columbia, if a pathogen is found that cannot be treated and should result in the culling of those animals, then the entire cohort is culled, not just the animals that tested positive.²²²

Table 1.9.1 Methods of disease control, by category

Category	Explanation and comments
Mass slaughter	All individuals in a population at risk that were potentially exposed to the disease are killed and disposed of
Test and slaughter	Only fish that test positive for the presence of the disease or pathogen are killed and destroyed. As most tests for fish disease require the fish to be killed to achieve a diagnosis, this is typically not an alternative under commercial farming conditions
Quarantine or isolation	Exposed and/or infected individuals are separated from other susceptible individuals in a manner that prevents transmission of a pathogen. Open netpen systems or closed pens that do not have capacity to treat water are not conducive to this intervention
Mass treatment	All infected or exposed individuals are treated with a drug or chemical to kill the pathogen and reduce it to a level where it cannot be sustained and cause harm in individuals and populations.
Mass vaccination	Vaccines are used to bolster the immune system, allowing it to combat the infection. This action is best used in groups not yet exposed to a pathogen due to the time delay between vaccination and a protective immune response
Environmental management	Changing features that stress fish and increase their susceptibility (water oxygen, water temperature, crowding, nutrition etc) or facilitate exposure to the pathogen (poor hygiene and biosecurity etc) in a manner to reduce exposure or susceptibility to infection
Education	Providing information to allow for appropriate assessment of the significance of a disease (and thus need to act), the best way to treat and/or best way to prevent a disease
Surveillance	Monitoring a population until such time as a specific threshold of diseases signals the need to intervene
No action taken	

Source: Reproduced from Exhibit 1561, p. 41.

Ms. Stewart expressed concern that rapid response in terms of “mass treatment” is not possible when treatment comes in the form of medicated feed, because feed needs to be ordered, milled, and then shipped to the farms, which are often in remote locations.²²³

Sea lice treatment

There are two species of sea lice that infect salmon (both farmed and wild) in the coastal waters of the province: *Lepeophtheirus salmonis* (the “salmon louse” or “*Leps*”), and *Caligus clemensi* (the “her-ring louse” or “*Caligus*”). In Volume 2, I discuss sea lice as a possible cause of the decline. In this section I review the evidence that I heard about sea lice treatment. As noted above, farmed fish are treated for sea lice normally as a preventive measure for the protection of wild salmon, not because treatment is medically necessary for the farmed fish.²²⁴

“SLICE” is the trade name of the only in-feed therapeutant that is used to treat fish for sea lice in British Columbia.²²⁵ The active ingredient in SLICE is emamectin benzoate.²²⁶ The treatment of farmed salmon for sea lice is done only on a prescription written by a veterinarian; SLICE treatments are not mandated by regulation.²²⁷ In around 2003, BCMAL set a “three motile-lice trigger” level for SLICE treatment.²²⁸ When the trigger level was reached, other species-specific management actions were triggered. Assessments had to be increased to twice per month, and, if the trigger was reached during the outmigration of wild juvenile salmon (March 1 to June 30), a farm would have to implement further actions as outlined in its lice management strategy.²²⁹

According to BCMAL, initial assessments conducted in the period 2003–5 showed that farmed Pacific salmon harbour very few lice. Therefore, BCMAL did not require fish farms cultivating species of Pacific salmon to “routinely count and report lice abundance; however, producers continue to visually monitor the Pacific salmon for sea lice at opportune times.”²³⁰

Dr. Sheppard explained the three motile-lice trigger for SLICE treatment as follows:

The trigger level of three motile lice per fish in the out-migration period was initiated, that trigger, I think, around the period of 2004, and it

was largely based on the precautionary principle in looking at the scientific information from other regions that were having effects by a pathogenic strain of this *Lepeophtheirus salmonis*, Atlantic salmon louse, or Atlantic Ocean louse. And so the Province of British Columbia adopted that same level, which would be comparable to what was seen as a trigger level in Norway and in Europe.²³¹

Sometimes SLICE is applied below the three motile-lice trigger if, for example, fish are going to be harvested, precluding a later treatment of SLICE due to the withdrawal periods necessary (for human health reasons) before harvest. In those cases, SLICE is applied earlier to ensure that lice levels are kept low during the outmigration of smolts.²³²

Dr. Sonja Saksida, executive director of the Centre for Aquatic Health Sciences and a private veterinarian who works for salmon farmers, told me that farms in the province treat for sea lice much less frequently than in other jurisdictions; there are BC farms that never have to treat because they never reach the trigger point. She said that most farms that do treat for sea lice do not treat more than twice in a production season (which is equivalent to once per year).²³³ Dr. Saksida also testified that she treats for *Leps* on farms at “far lower thresholds than I would believe that the fish are actually experiencing stress” but that, on the few occasions when she has treated for *Caligus*, “it is because I believe that the fish were actually – that it might be a welfare issue.”²³⁴

Michael Price, biologist, Raincoast Conservation Foundation, testified that “SLICE does not appear to be very effective at reducing *Caligus*” (the species of louse predominantly found on Fraser River sockeye – see Volume 2) but that following salmon farms is effective, “specifically on the juvenile sockeye migration route.”²³⁵ However, Dr. Saksida said that finding *Caligus* on farms is “a rare occurrence” but when it happens, SLICE “is an effective treatment for *Caligus*.”²³⁶

Dr. Simon Jones, research scientist, Aquatic Animal Health Section, Science, DFO Pacific Region, testified that “the development of resistance to the widely-used therapeutic [SLICE] is an obvious consequence” – that where stringent triggers or thresholds are used for the application of SLICE, resistance can develop as a result of

overuse. He said, “[I]t is a [phenomenon] that is not uncommon in biology, that under selective pressure that you can see the rise of resistant strains.”²³⁷ Similarly, Dr. Craig Orr, executive director, Watershed Watch Salmon Society, said that there is no question that SLICE is effective for lice on this coast but that he has concerns about how quickly resistance could develop.²³⁸ He favours the use of chemical therapeutants as an “emergency interim measure” only. In his view, to continue to treat sea lice, “you have to probably be removing these salmon farms from the migration routes of these juvenile fish if you want to have sustainable long-lasting benefits.”²³⁹

Dr. Saksida testified that there are no signs of resistance to SLICE in British Columbia. She said sea lice are “still very susceptible to SLICE.”²⁴⁰ Dr. Noakes, author of Technical Report 5C, Noakes Salmon Farms Investigation, said that, in his view, the risk of lice on salmon farms developing resistance to SLICE is minimized by the fact that, each year, returning migrating wild salmon recruit lice from a large population of lice in the North Pacific and then transfer those lice to fish farms as they pass by on their home migration. He also said that efforts to reduce the possibility of SLICE resistance could be achieved by relaxing the trigger for treatment, and only treating at times when it will protect the outmigrating juvenile salmon.²⁴¹

Some witnesses identified additional options for managing sea lice levels on fish farms. Dr. Jones said that “enhanced management actions for sea lice” could include “monitoring and surveillance of the farm population, appropriate siting and stocking activities and harvesting activities, in other words, being coordinated. It would include treatment where practical or harvest where appropriate.”²⁴² Dr. Orr talked about methods that have been used in the Broughton Archipelago:

[A]ge class management, [whole] bay management, you know, coordinated treatment of farms, early treatment of farms, that’s been the biggest benefit for the Broughton. All the farmers are treating in December which has been a real big benefit for the wild fish, you can reduce the numbers of lice. You can reduce the impacts and infestations on wild fish. But we don’t yet know whether that’s enough to counterbalance the

population of impacts we’ve seen in those fish. Those studies haven’t been done.²⁴³

Closed containment systems

Some participants in this Inquiry suggested a transition from net-pen salmon farming to closed containment aquaculture as a means of addressing some of their concerns about open-net pen aquaculture. Dr. Dill said that, although improvements in fish husbandry can reduce risks to wild salmon, the only thing that can eliminate risks is to “get them out of the same common water.”²⁴⁴ The province has said that “[t]he development of closed containment aquaculture as an alternative to conventional net pens aligns with the Ministry’s goals for the development of an aquaculture sector that is economically, environmentally and socially sustainable.”²⁴⁵

DFO describes “closed containment” aquaculture as follows:

Closed-containment is a term used to describe a range of technologies that attempt to restrict and control interactions between farmed fish and the external aquatic environment with the goal of minimizing impacts and creating greater control over factors in aquaculture production. Closed-containment introduces a range of new complexities, including CO₂ build up, waste management, siting and installation and energy requirements.²⁴⁶

DFO’s work related to closed containment falls under the director of innovation and sector strategies, under the Aquaculture Management Directorate (AMD) at national headquarters, with support from DFO Science.

In 2008, DFO’s Canadian Science Advisory Secretariat (CSAS) reviewed six papers, which in turn reviewed over 40 closed containment systems around the world, finding that none was “producing exclusively adult Atlantic salmon and that many previous attempts to do so had failed.”²⁴⁷ Reasons for previous failures included “mechanical breakdown, poor fish performance, management failure, declines in market price and inadequate financing.”²⁴⁸ CSAS recommended further work, including work on rearing Atlantic

salmon in fresh / brackish water, water quality parameters, the animal welfare aspects of rearing salmon at high densities, disease risk assessments and quantitative monitoring, and environmental impacts associated with net-pen aquaculture and closed containment alternatives.²⁴⁹

Other recent reviews of closed containment technology include a 2008 study for the Coastal Alliance for Aquaculture Reform, the David Suzuki Foundation, and the Georgia Strait Alliance called *Global Assessment of Closed System Aquaculture* and a May 2010 report by the Save Our Salmon Marine Conservation Council called *Technologies for Viable Salmon Aquaculture – An Examination of Land-Based Closed Containment Aquaculture*. Neither of these reports is in evidence before me, but other exhibits suggest they either advocate for closed containment aquaculture or conclude that there are no technological barriers to closed containment aquaculture.²⁵⁰

In September 2010, DFO's AMD published *Feasibility Study of Closed-Containment Options for the British Columbia Aquaculture Industry* with the goal of using "financial analysis tools to respond to the CSAS report" described above.²⁵¹ The report compared a conventional net pen with a closed containment, land-based "recirculating aquaculture system" (RAS).²⁵² The report found as follows:

Overall, the analysis showed that RAS technology is marginally viable from a financial perspective, but that it presents a higher level of risk compared to net-pen systems. However, these findings still need to be assessed – and their assumptions validated – in a real-life scenario. Potential next steps could include a pilot scale or demonstration system capable of producing salmon at commercially viable levels (e.g., one module scalable to financially feasible levels) to demonstrate the technical and financial feasibility of closed-containment salmon rearing under real world conditions.²⁵³

Marine Harvest Canada, in collaboration with Coastal Alliance for Aquaculture Reform (CAAR), has commenced work on a pilot project to test the feasibility of RAS technology. Witnesses from both Marine Harvest and CAAR spoke about this project. Clare Backman, a representative from Marine

Harvest, said that the company is working on a pilot project for a closed containment fish farm – using RAS technology that it has developed for its hatcheries. Mr. Backman described the main benefits of closed containment to his company:

You maintain the quality and the control over the environment of the water in which fish are living in terms of chemical makeup of the water, freedom from pathogens. And so those elements are beneficial to the grower. We can be sure that we're not going to be losing our product due to changes in the environment.²⁵⁴

Mr. Backman said the pilot project will document all the costs and look for cost efficiencies. Preliminary work "showed us that the likelihood of it being economically profitable at this time was slim," but he said it was still "worthwhile to take what we know now to the next level and actually determine where improvements could be made to bring in greater efficiencies and see what level within our entire range of growth options ... where it would fit into the mix."²⁵⁵ He gave his view that at this point in time the risks do not justify the cost of moving to closed containment in a short period of time.²⁵⁶

Ms. Stewart said that often the cost of waste disposal associated with net pens does not get considered in the evaluation of closed containment because companies are "able to externalize that cost into our ocean waters."²⁵⁷ She said it is important to "compare the value of those ecosystem services that are currently being provided at no cost to the industry, so that we're looking at apples to apples and there's a more level playing field when factoring in the actual operating costs."²⁵⁸ Mr. Backman responded by saying that there are currently costs associated with monitoring and fallowing of current net-pen technology that are internalized by a company. He said the "Conservation Strategies Fund" report that will evaluate the pilot project is intended to capture all these things.²⁵⁹ Ms. Parker provided an example of costs internalized by the industry: under the former provincial waste regulations for salmon farms, companies had to pay annual waste management fees depending on the amount of waste discharged.²⁶⁰ Mr. Backman said this "went into the hundreds of thousands of dollars every year" for all Marine Harvest sites.²⁶¹

■ Fish health management at salmon enhancement facilities

Salmon enhancement or production facilities are described in Chapter 6, Habitat management. In brief, these facilities include hatcheries, spawning channels, and other improvements; there are 23 major federal (DFO) enhancement facilities, 21 community hatcheries operated as part of the Community Economic Development Program (CEDP), and about 350 public involvement projects (PIPs) which are supported by 18 DFO community advisors.²⁶² There are also provincial trout hatcheries operated under the Freshwater Fisheries Society of BC (FFSBC).

During the hearings on the marine environment, Dr. Richard Beamish, retired research scientist, Salmon and Freshwater Ecosystems, PBS, testified that disease can occur in hatcheries and many cases may not be reported or investigated because hatchery fish do not exhibit clinical signs of disease (or hatchery staff may not recognize the clinical signs of disease).²⁶³ During the hearings on disease, two expert witnesses, Dr. Craig Stephen and Dr. Christine MacWilliams, gave further testimony about the potential for disease transfer from fish enhancement facilities to wild Fraser River sockeye. Dr. Stephen is the author of the Commission's Technical Report 1A, Enhancement Facility Diseases.²⁶⁴ Dr. MacWilliams is a fish health veterinarian in the Aquatic Animal Health section and the veterinarian responsible for DFO's Salmonid Enhancement Program (SEP).

Federal conditions of licence in respect of fish health

Under the *Pacific Aquaculture Regulations*, DFO issued licences to salmon enhancement facilities on July 1, 2011. These licences contain general conditions of licence. The entirety of the fish health conditions is as follows:

3. Fish Health

- 3.1 The fish cultivated in the enhancement facility must be given the care and

attention consistent with their biological requirements.

- 3.1 If there is a fish health problem, it must be investigated by the licence holder or designate. The project may seek advice / assistance from the FHV* directly if the licence holder or designate is not available.
- 3.3 All reasonable efforts shall be made at the enhancement facility to keep complete and accurate records of fish health and inventory in the enhancement facility, using Appendix III (attached) to capture the relevant information.
- 3.4 Major mortality events shall be reported within 24 hours to the FHV. Where the licence holder or designate is unavailable, the project shall contact the FHV directly.
- 3.5 Where fish must be destroyed, the licence holder shall seek the directions of the FHV.²⁶⁵

In addition, the general conditions say that fish shall be released only if “no disease outbreak is apparent in the stock and losses in the stock have been low during the entire rearing period; and the stock is not currently being treated for a disease, nor has it had an antibiotic treatment during rearing.”²⁶⁶ There is no prohibition against releasing diseased fish, only that losses must be “low.” There are minimal data-reporting requirements; licensees need only make “reasonable efforts” to record fish health information. There are no self-monitoring requirements. Further, there is no formal government auditing program.

As of July 2011, there was no requirement under the conditions of licence for salmon enhancement facilities to have a Fish Health Management Plan; see discussion above. However, as discussed below, some facilities do have FHMPs.

Roles and responsibilities

Dr. MacWilliams, as the fish health veterinarian assigned to SEP, has responsibility to oversee fish health issues in all the enhancement facilities under that program. She explained that the major DFO

* FHV refers to the fish health veterinarian who is a licensed veterinarian in British Columbia and on staff at DFO. As of the time of hearings in August 2011, the FHV was Dr. Christine MacWilliams.

facilities have professional “fish culturists” on site who are responsible for the FHMPs and operations at a given hatchery in concert with their managers and with Dr. MacWilliams.²⁶⁷ The community facilities have “fish culture staff” who do the daily husbandry and care, and an assigned community advisor who is a DFO staff person who can provide “advice and technical support” and be a liaison to Dr. MacWilliams.²⁶⁸

Management practices and operating procedures

According to Dr. Stephen, when dealing with disease at fish production facilities, there is “no management standard against which to work.”²⁶⁹ As Dr. Stephen described in Technical Report 1A, Enhancement Facility Diseases, a management standard is important for knowing what is reasonable in terms of risk assessment:

We know of no legal fish health standard that establishes an acceptable level of fish pathogen risk for enhancement operations except for legislation dealing with the exclusion of foreign or exotic disease from Canada. A single standard for acceptable exposure cannot currently be defined as the capacity for individuals and populations to cope with a disease is context specific and would be affected by things such as the pathogen, host species, life stage, habitat quality, water temperature and many other factors.²⁷⁰

Dr. Stephen recommended that DFO set a health management target or standard for acceptable risk.²⁷¹

In oral testimony and in his report, Dr. Stephen noted a number of deficiencies relating to disease in terms of standard practices and record keeping at fish production facilities. For example, there was a lack of consistency in record keeping at the hatcheries, “particularly when we got to some of the community and public involvement programs where we were getting handwritten records.”²⁷² For provincial facilities, Dr. Stephen said that the biggest challenge in writing his report was that he was only able to get some “anecdotal evidence about release patterns,” though he reported that the province did say that it does not “release their fish into sockeye-bearing lakes or take their brood

stock from lakes with sockeye salmon, so that would suggest there would be a lower opportunity for exposure [of sockeye to diseased hatchery fish].”²⁷³ He recommended improvements to auditing and oversight of fish health, especially in terms of assessing risk to wild fish.²⁷⁴

Dr. MacWilliams testified that “the level of screening [of enhancement facilities] is, in my opinion, ... sufficient. We ... probably [do] not miss any disease outbreaks.” She said that, under the SEP, DFO screens for BKD in watersheds where it knows the bacteria is present. For IHN virus, DFO does annual screening of sockeye broodstock. She further said DFO has a number of management practices in place to limit the risk of disease, such as “compartmentalization” of stocks among multiple sites and the use of virus-free water sources. However, she admitted that only some pre-release screening of fish for disease is done and this screening is done only at major DFO facilities.²⁷⁵

Each of DFO’s major facilities, as well as the CEDP and PIP facilities, takes steps to treat infectious diseases. Facilities with FHMPs follow these plans for drug and chemical treatments of fish. However, treatment records exist in a variety of non-standardized formats. The application and reporting of chemical and pharmaceutical treatments vary from facility to facility, and treatment records are not always accompanied by a diagnosis.²⁷⁶

Technical Report 1A, Enhancement Facility Diseases, reviewed FHMPs for DFO facilities and reported that they contain generic and specific biosecurity and management principles.²⁷⁷ Pre-release risk assessment information is not consistent across DFO facilities. For example, some DFO facilities do not require any formal pre-release risk assessment, and facilities with formal pre-release operating procedures require varying degrees of assessment.²⁷⁸ FHMPs contain operating procedures relevant to a fish health event or potential disease outbreak, including procedures for sample collections and quarantines. Specific procedures for the collection and counting of dead fish, disinfection of equipment, and disposal of dead fish vary by hatchery, but overall there are similar biosecurity principles. DFO applies the principles of the *Alaska Sockeye Culture Manual* for IHN control. DFO no longer does routine broodstock screening for this disease because of the lack of historical correlation between

screening outcomes and subsequent diseases. It does population screening by testing 60 fish and, if IHN is found to be prevalent (level not specified), it will do additional egg disinfection.²⁷⁹

CEDP and PIP operating procedures vary in scope and completeness.²⁸⁰ FFSBC's standard operating procedures include health risk assessments of fish releases for fish that are known to have been exposed to a pathogen, that have been treated with a drug or chemical or are affected by an unknown cause of death or illness, or that require a permit for transport.²⁸¹

Technical Report 1A summarizes the main issues found by Dr. Stephen relating to FHMPs:

All major DFO and FFSBC hatcheries have Fish Health Management Plans that are intended to support the goal of not releasing fish with known infections. The Plans have not been audited. There are inadequate resources to allow fish health professionals to visit enhancement facilities to help adapt Fish Health Management Plans to local conditions, audit their practices and develop ongoing disease prevention programs. The Plans vary in detail and in their adaptation to local conditions. There is little opportunity to apply Fish Health Management Plans to spawning channels and it did not appear that the Community Economic Development Program or Public Involvement Project hatcheries have comprehensive fish health management plans.²⁸²

When asked about FHMPs at the hearings, Dr. Stephen appeared to be of the view that FHMPs for enhancement facilities were just template documents.²⁸³ These FHMPs did not bolster his confidence that the plans were being met; there was no definite evidence that measures were actually being taken to reduce risks to wild fish.²⁸⁴

Dr. MacWilliams said all the DFO major facilities have FHMPs as a condition of licence, though that is not apparent from the licences issued in July 2011.²⁸⁵ FHMPs include biosecurity practices and standard operating procedures. Community production facilities have a "small booklet with biostandards for culture rearing"; they have also been given a copy of the template

for the FHMPs, and "we've done a couple of workshops on writing SOPs or standard operating procedures for the CEDPs to encourage them to start writing down their own procedures of what they do in developing their own set of SOPs for operations."²⁸⁶

With respect to the three tenets of biosecurity (described above in the section on salmon farms), Dr. MacWilliams said the following are specific measures used by DFO:²⁸⁷

- choosing broodstock;
- disinfecting eggs;
- practising daily surveillance;
- using mortality or morbidity rate thresholds for contacting fish health professionals;
- separating broodstock from incubation;
- optimizing nutrition;
- limiting handling; and
- controlling densities.

Release of diseased fish

In his report, Dr. Stephen documented cases where fish with known or suspected infections were released from fish production facilities into fish-bearing waters. In none of these cases was there evidence of post-release monitoring of surrounding wild fish.²⁸⁸ Dr. MacWilliams agreed that DFO enhancement hatcheries periodically release fish that are known to be carrying pathogens, specifically, BKD.²⁸⁹ DFO treats BKD in the hatchery population with antibiotics and does pre-release screening to determine the population-level prevalence of the disease. If that level is deemed "too high," they cull the fish; if not, they release them, recognizing that a zero-tolerance level does not work for endemic pathogens.²⁹⁰ Dr. MacWilliams did not say what degree of population-level prevalence for BKD is acceptable. However, a 2010 memorandum from Dr. MacWilliams to staff at the Snootli Creek Hatchery notes that "[t]he high prevalence of BKD in this stock is a bit overwhelming. I'm glad these progeny will all be promptly released to reduce the horizontal transmission of this pathogen during prolonged rearing."²⁹¹ In testimony, Dr. MacWilliams explained that "low positives" of the pathogen levels are considered suitable for

fry release, but that moderate-to-high positive pathogen levels ordinarily result in destruction of the fish.²⁹²

Dr. MacWilliams described other circumstances where diseased fish may be released. Fish may be released from enhancement facilities with other “normal skin or gill parasites that are also endemic pathogens, ubiquitous in wild circumstances.” Some of these pathogens are cured by the entry into saltwater, and so in her view, although there is a risk that they will be passed to other freshwater stocks as they are migrating to the sea, this risk will decline in the estuary and beyond. Finally, the other situation where disease-positive enhanced fish may be released to the wild is when these fish are reared in open-net pens where the “rule of thumb is normally that if [there is] any sign of mortality, regardless of what the cause is, we let them go.”²⁹³

■ Case study: infectious salmon anemia virus

During the hearings on disease in August 2011, Dr. MacWilliams and Dr. Kent testified that ISAv had never been identified in wild or farmed BC salmon.²⁹⁴ However, as noted in the introduction to this chapter, during the fall of 2011 two non-government laboratories reported positive test results for ISAv in wild Pacific salmon off the BC coast. I reopened the Commission’s hearings to hear evidence about tests for ISAv conducted on wild Pacific salmon and Canada’s responses to those tests. I discuss that evidence here as a case study of how Canada responds to potential health threats to Fraser River sockeye salmon.

I did not set out to investigate ISAv as a case study; it is a topic that emerged in the public realm during the course of this Inquiry. It engaged the Terms of Reference of this Inquiry, in particular my investigation into disease as a cause of the decline, the policies and practices of DFO, and the future sustainability of the Fraser River sockeye fishery. Although I would not have chosen to focus so much attention on one particular disease (without evidence that it is responsible for the decline in Fraser River sockeye), the hearings on ISAv provided me with a valuable understanding

of how fish health issues are addressed in Canada and the state of readiness of programs and policies to deal with disease, particularly in wild Pacific salmon.

The ISAv case study is a story about how DFO and CFIA, its partner under the NAAHP, have investigated the presence or absence of ISA in BC waters. The telling of this story was prompted by laboratories at the Atlantic Veterinary College (AVC) under the supervision of Dr. Frederick Kibenge, and the University of Bergen in Norway, under the supervision of Dr. Are Nylund, which reported presumptive positive tests for ISAv in wild BC salmon. These reports led to a CFIA investigation and further testing (to confirm results) by the DFO laboratory in Moncton, under the supervision of Ms. Gagné. CFIA interpreted test results against the backdrop of years of negative test results for farmed salmon in British Columbia, conducted by the BC Lab in Abbotsford under the supervision of Dr. Marty. CFIA ultimately reported that there is no evidence of ISAv in British Columbia. The AVC and Norway tests also led to DFO’s disclosure to this Inquiry of ISAv test results – including presumptive positive results – it obtained in 2003 and 2004, under the supervision of Dr. Molly Kibenge (whose first name I will continue to use to distinguish her from her husband, Dr. Frederick Kibenge), and more recent tests conducted on historical sockeye samples during the fall of 2011, under the supervision of Dr. Kristina Miller. DFO also produced results of negative ISAv tests in sockeye salmon conducted under the supervision of Dr. Kyle Garver in 2010 and 2011.

Because the various tests were conducted by different researchers, using different methods, and reaching different results, testing methodologies became an issue during the ISAv hearings. I also heard evidence about the accuracy of DFO’s communications, the focus and purpose of DFO’s research in this area, and the adequacy of information-sharing with non-DFO researchers.

In the sections below, I discuss ISAv, testing methods and their limitations, methods used and results obtained by the various researchers mentioned above, and the management responses to the presumptive positive tests for ISAv.

What is ISAv?

Dr. Kibenge, who heads the OIE reference laboratory for ISA located at the AVC in Prince Edward Island, described ISAv as follows:

ISAV is Infectious Salmon Anaemia virus, and that's a virus for fish. It infects farmed Atlantic salmon and ... it is called the Infectious Salmon Anaemia, or ISA. The virus structure of this virus is similar to influenza viruses and they are both grouped together in the same virus family. The family is called Orthomyxoviridae ...

I think right now Infectious Salmon Anaemia virus is probably the only known [example of] what are characterized [as] Orthomyxo virus that affects fish ...

ISA virus is – it causes communicable disease in farmed Atlantic salmon, but it has also been found in various species of wild fish.²⁹⁵

There is a difference between the detection of the ISA virus and the actual disease; a fish may be able to carry the virus without actually coming down with the disease. Dr. Nylund, head of the fish disease group at the University of Bergen (Norway) and a leading world ISA expert, explained that “usually you will only find disease development in Atlantic salmon” – not the other salmonid species, though they may carry the virus.²⁹⁶ Dr. Kibenge said ISA lesions, symptomatic of ISA, “have only been documented in Atlantic salmon.”²⁹⁷ Tests on Pacific salmon (steelhead trout, chum, chinook, and coho) showed that these Pacific salmon species “are quite resistant to ISAV relative to Atlantic salmon”; however, the potential for ISAv to adapt to Pacific salmon “should not be ignored.”²⁹⁸

ISAv is spread through water and may also be spread through vectors such as sea lice (*Lepe* in particular).²⁹⁹ Transgenerational transmission (from parent to offspring) may also be possible.³⁰⁰

The ISA virus is an RNA virus that has a genetic sequence composed of eight segments (called segment 1, segment 2, segment 3, etc.). Each segment is composed of nucleotides and ranges in size from roughly 970 nucleotide to 2,300 nucleotide bases.³⁰¹ There are two known major genotypes: the European and the North American. The European genotype has been subdivided into several clades.³⁰²

The European genotype of ISAv was first detected in Norwegian salmon farms in the mid-1980s.³⁰³ ISA was later detected in New Brunswick salmon farms in 1996,³⁰⁴ and since then both the European and North American genotypes of the virus have been detected in Atlantic Canada salmon farms.³⁰⁵ Dr. Kibenge testified that a survey published in 2002 documented ISAv in wild Atlantic salmon in Canada “on a few occasions,” but “the report that keeps coming back is that these [wild] fish have virus without communicable disease.”³⁰⁶

Dr. Nylund explained that scientists think the European and North American strains of ISAv diverged from one another over a hundred years ago.³⁰⁷ As set out below in the section describing results of recent ISAv testing on Pacific salmon, Dr. Miller has obtained presumptive positive test results for ISAv in Pacific salmon samples collected as long ago as 1986. She said that the level of divergence in segment 7 of her samples, as well as the fact that she detected viral genetic material as far back as 1986, suggests that ISAv (or an ISAv-like virus) might have existed in Pacific salmon for more than 25 years.³⁰⁸

Dr. Nylund also explained that there are avirulent (non-virulent) and virulent forms of ISAv. Avirulent forms can mutate into virulent forms:

[I]f you look at evolutionary biology, in a fish farm where you have a large population density, many hosts, if you have mutation it has the opportunity to spread and multiply. In a wild population, which is very small, few individuals, such a mutation will be very fast lost in a wild population, while in a farm population it can multiply for several – yeah, for years, actually, depending on how the farms are run.³⁰⁹

In 2007, ISA was detected in Atlantic salmon farms in Chile. Dr. Kibenge, who was involved in detecting that outbreak, said it was called the “Chilean ISA crisis ... it destroyed about 75 percent of their production.”³¹⁰ ISA virus isolated from farmed Atlantic salmon in Chile in 2008 belonged to the European genotype and was “in a clade with exclusively Norwegian ISA viruses, where one of these isolates was obtained from a Norwegian brood stock population.”³¹¹ The 2008 study, in which Dr. Nylund was one of the co-authors, concluded

that “Norway export[s] large amounts of Atlantic salmon embryos every year to Chile; hence, the best explanation for the Norwegian ISA virus in Chile is transmission via these embryos, i.e. vertical or transgenerational transmission.”³¹²

Test methods and protocols

Anyone who attended the ISAv hearings became conversant in the language of the molecular diagnostic tests used to screen for and diagnose viral diseases such as ISA. In order to set out the evidence, it is necessary to explain a few terms and concepts related to testing methods.

Common screening tests for ISAv use a molecular method called RT-PCR, or reverse transcriptase polymerase chain reaction.³¹³ The purpose, as I understand it, is to find within a sample of tissue from the host organism, RNA genetic material specific to the ISA virus – and then replicate (or amplify) it into a quantity that can be detected. In order to be amplified using the PCR method, RNA must first be converted into DNA using a process called reverse transcription – the RT part of RT-PCR.³¹⁴ Laboratories may also test for RNA quality prior to running RT-PCR tests. This may be accomplished by testing for the quality of a reference gene from the host organism.³¹⁵

After the RT step, the amplification of DNA in a sample happens with the assistance of highly specific genetic primers, which are designed to amplify a known sequence of DNA from within the sample, if such a sequence is in fact present. Ms. Gagné described the methods as follows:

In this case we're working with RNA viruses, so we need to start by extracting the RNA from, in this case, a fish tissue. And if the RNA of the virus is present in there, mixed with the RNA of the fish, where we'd try to detect it with the PCR assay.

So the assay requires primers. Primers are short custom-made segments of DNA that will anneal [bind to target genetic material] if there's a match with the DNA in your mixture. If the virus is in the mixture with the DNA of

the fish, we would get a match, and the PCR process will amplify that segment between the two primers that you have put in your mixture.

The probe is in between those primers. The probe is linked with a reporter or fluorescent molecule. So when the PCR process goes on, if there was a match with the primers first, the PCR process amplifies what's in between those primers, so it creates a sequence, a short fragment of DNA, and the probe will be released, and what the real time RT-PCR [assay] detects is the fluorescence from a probe.

...

In the conventional RT-PCR, there is no probe. We amplify what's – the primers will anneal to a matched sequence, and the polymerase reaction will amplify what's between those primers, the primer is included. So there is no probe. But at the end of the process we will put the product in a gel, and if there was sufficient target [viral genetic material] to start with in the material [sample], we will see the amplification product on the gel after electrophoresis.

With the real-time assay it's different because you have the probe, you don't need to use a gel, you just rely on the fluorescence produced by the probe.³¹⁶

The amplification of DNA occurs over a series of replication cycles in which one copy is replicated into two, two copies into four, four copies into eight, and so on. After the targeted DNA sequence is amplified, its presence must be detected, using either a “real-time” or a “conventional” technique.

If a real-time assay is being used, when sufficient probes are released, the fluorescence can be detected with a machine, indicating a positive test for the virus.³¹⁷ The “Ct” value refers to the number of cycles run before the fluorescence is detected. In general, although there is some variability between laboratories, the lower the Ct value, the greater the number of virus particles detected in the sample. (A difference of three Ct values is approximately the equivalent of a tenfold difference in the amount of genetic material detected in the sample.)³¹⁸ If a conventional assay is being used, the amplification procedure will be stopped after a certain number of cycles and the product of the amplification will then be run on

a polyacrylamide gel with electrophoresis. If the target genetic product is detected, it will produce a visible band on the gel; the bigger the band, the greater the number of copies produced from the original sample.³¹⁹

If ISAv is detected by PCR, the next steps are usually to try to sequence the PCR product to compare it to known genetic sequences of the virus, and to try to culture the virus.

Dr. Miller described genetic sequencing as “an ultimate validation that what you’re picking up by PCR is a real product and it’s the product that you’re expecting to be picking up.”³²⁰ The method of checking one’s sequence against known ISA viral sequences is called “blasting.” The sequence from the test is sent to a large database of known sequences and blasted against those known sequences to look for matches. The result is a list of best matches showing the percent homology or divergence of the sample sequence to known sequences.³²¹

Cell culture is a process whereby scientists attempt to grow a virus on a cell line that has been developed for that purpose. If successful, it provides good evidence of the virus. However, the method is not always successful. Not all strains of ISAv can be cultured;³²² infections that show up as Ct values over 30 in a real-time PCR test usually cannot be cultured;³²³ and ISAv can only very rarely be cultured from wild fish.³²⁴ Indeed, Dr. Miller mentioned that it originally took “something like eight years to culture [ISAv] out of Norway.”³²⁵ Similarly, Dr. Kibenge said that during the Chilean ISA crisis in 2007–10, it was very difficult to use cell culture as a diagnostic method, so the principal method used during that outbreak was real-time RT-PCR.³²⁶

Limitations, sensitivity, and reproducibility of RT-PCR methods

Dr. Kibenge, Dr. Nylund, Ms. Gagné, and Dr. Miller collectively identified several limitations of RT-PCR testing for ISAv, particularly in applying current testing methods to Pacific salmon such as sockeye:

- 1 Tests may not be repeatable for light infections (detectable at high Ct values, over 35) using some assays.³²⁷
- 2 Different assays may have different relative sensitivities to different genotypes and/or different variants of the ISA virus.³²⁸ For

example, in Dr. Miller’s testing, she found the “Snow segment 8” assay (described below) to be the least sensitive for picking up ISA-like virus in Pacific salmon; she also found that she gets “a lot more positives from segment 7” such as the test developed by Plarre (described below).³²⁹ Dr. Miller commented that the use of multiple assays has advantages:

If you don’t know that your assay picks up whatever variant is here, it’s sort of meaningless. In my view, if you really wanted to do this properly, you would look at more than one segment of a virus to make sure that ... you weren’t picking up false negatives.³³⁰

- 3 Most RT-PCR tests for ISAv have been designed to target the most conserved regions of the genome in segments 7 and 8 and they are designed to detect known strains of ISAv.³³¹ Their ability to detect novel strains is unknown.
- 4 Current tests for ISAv have been developed based on viral infections in Atlantic salmon, not Pacific salmon. As Dr. Kibenge explained, in Atlantic salmon “we know the best tissue to take, which has the most amount of virus,” but for “sockeye salmon and other wild fish in B.C., we really don’t have a very good idea of the disposition of this virus in the tissues. We don’t know which is the best tissue to take, at what time, and what’s the amount of virus that is likely to be in this fish.”³³²
- 5 There is substantial difference in the repeatability of RT-PCR test results among different laboratories.³³³ Dr. Nylund said there could be several different reasons for this, including the assay and the interpretation of results.³³⁴
- 6 Diagnostic sensitivity of certain assays might be influenced by the thermocycler machines and software used in real-time RT-PCR to detect fluorescence.³³⁵ In a study by Dr. Kibenge, looking at 12 different laboratories, seven laboratories which use Stratagene real-time machines with the associated MXPro software reported “consistently very high Ct values” and in some cases false negatives for known ISAv positive samples, compared to the LightCycler system by Roche and systems by ABI.³³⁶

The Stratagene systems produced results approximately three to seven Ct values higher than the other machines. According to Dr. Kibenge, this means “if you’re using that machine, you are most likely to miss positive samples that have low virus amounts.”³³⁷

Ms. Gagné, whose laboratory uses the Stratagene system, said she thought Dr. Kibenge’s results in this study were “just pointing to a coincidence, not a problem with the machine probably.”³³⁸

- 7 The length of the nucleotide sequence amplified by different assays (the “amplicon”) can influence the sensitivity of the test. “The smaller the target, the more sensitive the test.”³³⁹ Dr. Nylund recommends using an assay targeting around 60 nucleotides “because that is as sensitive as you can get when you have two primers and a probe.”³⁴⁰ DFO Moncton’s Aquatic Animal Health Section Diagnostic Laboratory’s manual on “Primers and Probes Design and Usage” recommends an “amplicon size of 50–150” for Taqman (a trade name brand of commercial primers and probes) probe assays.³⁴¹ The length of the probe part of the assay is also important, and can be as short as 13 nucleotides,³⁴² or even as short as seven or eight bases, though it is usually in the 21–25 base range.³⁴³

Confirming presumptive positives and use of validated tests

Dr. Nylund described the specificity of most RT-PCR tests as being very good:

[I]f you’re using an ordinary real-time PCR, I would say that the chances for picking up something else is very, very small. So I would say that an ordinary real-time PCR would be picking up ISA virus, but only the known ISA virus. So the chances of getting a false negative is larger than getting a false positive.³⁴⁴

Still, any diagnostic screening test carries a possibility of false positive or false negative results. One possible source of false positives is from

contamination. Sources of possible contamination include the presence in the laboratory of PCR products and plasmids that have multiplied the target gene, or fish highly infected with ISAV.³⁴⁵ Another potential source of contamination is positive controls.³⁴⁶ Contamination can be avoided through practices such as physical separation of activities³⁴⁷ (e.g., different rooms or work spaces for taking samples from fish, performing RNA and DNA extractions, mixing assays, and performing the reaction),³⁴⁸ using positive controls that contain an artificial insert so they can be distinguished from ISAV in the sample (in the event of contamination),³⁴⁹ bleaching surfaces regularly, taking a systematic approach to controlling contamination,³⁵⁰ and running several blanks alongside your samples to check for cross-contamination.³⁵¹

A false negative might result from sample degradation (hence negative results are reported as “inconclusive” when the samples are degraded)³⁵² or, as noted above, from using tests that are not ideal for detecting the strain targeted. Also as noted above, a low virus infection, where there are fewer copies of ISA RNA in the sample, may also be harder to detect, resulting in false negatives.

The OIE Aquatic Code³⁵³ requires confirmatory steps before diagnosing a disease. The OIE Aquatic Code defines a “suspect case” and a “confirmed case” of ISA as follows:

7.1. Definition of suspect case

ISA or infection with ISAV would be suspected if at least one of the following criteria is met

- i) Clinical signs consistent with ISA or pathological changes consistent with ISA (Section 4.2) whether or not the pathological changes are associated with clinical signs of disease;
- ii) Isolation and identification of ISAV in cell culture from a single sample (targeted or routine) from any fish on the farm, as described in Section 4.3.1.2.1;
- iii) Evidence for the presence of ISAV from two independent laboratory tests such as RT-PCR (Section 4.3.1.2.3) and IFAT* on tissue imprints (Section 4.3.1.1.2);
- iv) Detection of antibodies to ISAV.

* IFAT stands for indirect fluorescent antibody test.

7.2 Definition of confirmed case

The following criteria in i) should be met for confirmation of ISA. The criteria given in ii) and iii) should be met for the confirmation of ISAv infection.

- i) Mortality, clinical signs and pathological changes consistent with ISA (Section 4.2), and detection of ISAv in tissue preparations by means of specific antibodies against ISAv (IFAT on tissue imprints [Section 4.3.1.1.2] or fixed sections as described in Section 4.3.1.1.3) in addition to either:
 - a) Isolation and identification of ISAv in cell culture from at least one sample from any fish on the farm, as described in Section 4.3.1.2.1 or
 - b) Detection of ISAv by RT-PCR by the methods described in Section 4.3.1.2.3;
- ii) Isolation and identification of ISAv in cell culture from at least two independent samples (targeted or routine) from any fish on the farm tested on separate occasions as described in Section 4.3.1.2.1;
- iii) Isolation and identification of ISAv in cell culture from at least one sample from any fish on the farm with corroborating evidence of ISAv in tissue preparations using either RT-PCR (Section 4.3.1.2.3) or IFAT (Sections 4.3.1.1.2 and 4.3.1.1.3).³⁵⁴

The OIE Aquatic Code, section 4.3.1.2.3, recommends the following real-time RT-PCR methods for screening suspect cases and for confirmatory testing: segment 7 and segment 8 tests by Snow and others (2006);³⁵⁵ and a segment 7 test by Plarre and others (2005).³⁵⁶ Dr. Kibenge testified that the Snow segment 8 test is probably the most commonly used primer probe set for ISAv around the world.³⁵⁷

As noted above in this chapter, the NAAHLS does not use one of the OIE-recommended tests for ISAv; its laboratories use a test that the DFO Moncton laboratory has developed and validated as comparable.³⁵⁸ Ms. Gagné said, “[W]e use an assay that looks a bit like the Snow 2006 paper” targeting segment 8.³⁵⁹ Dr. Wright testified that the

test, developed by Ms. Gagné, has been validated as acceptable to both the OIE and Canada for ISAv testing.³⁶⁰ Dr. Wright said that any testing done on behalf of Canada under the NAAHP does not necessarily have to be done using Ms. Gagné’s test, but does need to be done using a validated test and in a laboratory approved by CFIA.³⁶¹ As of the time of the ISAv hearings (December 2011), no tests or laboratories other than DFO NAAHLS had been approved by CFIA.³⁶² Dr. Wright noted that for most other tests or laboratories the validation information is not available – the tests have not been validated with reference animals and analyzed for their diagnostic performance.³⁶³ Dr. Wright was not able to comment on whether the BC Lab in Abbotsford uses a validated test; some validation work may have been done but may not be in the form required for CFIA approval.³⁶⁴

Both Ms. Gagné and Dr. Wright testified about the need to adapt and modify assays for RT-PCR tests as new information becomes available or new strains of virus are identified. Ms. Gagné said, “[I]t’s written in our documents that we adapt, we evolve,” but she saw no indication that the DFO Moncton assay was not working.³⁶⁵ Dr. Wright said he did not know as of December 2011 whether Canada would have to update its test based on a possible new variant of Pacific ISAv.³⁶⁶

Methods and results of ISAv tests on wild Pacific and BC farmed salmon

Different laboratories use different testing “protocols” for their PCR screening tests. Protocols set out such things as the number of cycles per test, the length of the genetic sequence amplified by the assay, whether multiple assays are used, and whether a pre-amplification step is used prior to running a real-time PCR.* As noted above, the methods used can affect the ability of the test to detect ISAv. During the ISAv hearings, I had the benefit of hearing directly from Dr. Kibenge, Dr. Nylund, Ms. Gagné, and Dr. Miller about their methods and results. I also heard direct evidence

* For examples, Ms. Gagné’s protocol is at Exhibit 2047; Dr. Miller’s protocol is at Exhibits 2076 and 2041; the BC Lab’s protocol is at Exhibits 2048 and 2049.

from Dr. Marty of the BC Lab during the hearings about salmon farms in August 2011. In addition, I received indirect and documentary evidence about tests performed by these individuals, as well as by Dr. Molly Kibenge and Dr. Garver. I discuss each set of results, along with whatever information is in evidence on the test methods in the sections below.

Dr. Molly Kibenge, Pacific Biological Station (DFO), 2003–4

In 2003–4, Dr. Molly Kibenge conducted post-doctoral research at DFO's PBS under the supervision of Dr. Simon Jones.³⁶⁷ Dr. Jones described her work as being "to survey wild Pacific salmon for viruses, for IHN virus, VHS virus and for ISA virus and our expectation was that we would not see evidence of ISA."³⁶⁸ Dr. Molly Kibenge obtained positive PCR results for ISAv using the methods described by Devold and others (2000),³⁶⁹ which is an OIE-recommended test for conventional RT-PCR.³⁷⁰ An abstract she prepared for a draft paper describing her results reads as follows:

Juvenile Chinook (*Oncorhynchus tshawytscha*), chum (*O. Keta*), coho (*O. Kisutch*), pink (*O. Gorbushcha*), and sockeye salmon (*O. Nerka*) from the West Coast of Vancouver Island, Southeast Alaska, and the Bering Sea were surveyed between August 2002 and April 2003 for infectious salmon anaemia virus (ISAV). Spawning sockeye from the Cultus Lake and Kokanee from Lois Lake, BC population was also sampled. Pooled or individual tissues were tested by RT-PCR, nucleotide sequencing and virus isolation. ISAV segment 8 was amplified from 34 of 121 (28%) Chinook and 15 of 88 (17%) pink salmon caught off the west Coast Vancouver Island and southeast Alaska. ISAV segment 8 was also amplified from all 64 spawning sockeye and one cultured Atlantic salmon. The 220bp [base pair] RT-PCR products were 94% to 98% homologous with Canadian ISAV isolates and 92% to 93% with European ISAV isolates. A product of 377 bp was obtained with Segment 7 ORF1 products were obtained in 5 chinook fish and the nucleotide sequence corresponded to ISAV segment 7

ORF2 products and was 95.7% identical to NBISA01 control isolate (Canadian isolate) and 99.7% identity to an ISAV isolate 810/9/99 from Norway. ISAV segments 2, 6 and full opening frame for segment 8 were not amplified nor was ISAv isolated onto SHK or CHSE and ASK-2 cells [i.e., cell culture was not successful]. These results lead us to conclude that an asymptomatic form of ISA occurs among some species of wild Pacific salmon in the north Pacific.³⁷¹

Dr. Frederick Kibenge testified that there was "clearly a positive amplification of ISA virus in those samples."³⁷² However, he also said that for Cultus Lake sockeye the product obtained was not a match for ISAv.³⁷³ Indeed, in an email from Dr. Molly Kibenge to Dr. Jones, she says that "the sockeye clone sequences show homology to short sequences of human, mouse, rat, and zebrafish clones."³⁷⁴ Dr. Jones said this indicated that the PCR results for the Cultus Lake fish were false positives.³⁷⁵

Dr. Jones said that, in October 2003, they decided to get another opinion on Dr. Molly Kibenge's results, so they sent 20 blind samples of chinook salmon (10 that were positive in Dr. Molly Kibenge's results, and 10 that were negative) to the laboratory of Dr. Frederick Kibenge at the AVC.³⁷⁶ Dr. Frederick Kibenge was able to confirm that six samples were positive; however, three of these were in Dr. Molly Kibenge's negative samples and three were in her positive samples. Dr. Jones said that he, Dr. Molly Kibenge, Dr. Dorothy Kieser, and Dr. Garth Traxler decided to send samples to Ms. Gagné's laboratory at DFO Moncton for further testing.³⁷⁷

Ms. Gagné testified that, in 2004, she received 93 samples from Dr. Molly Kibenge and tested them for ISAv using the same primers and kits that Dr. Molly Kibenge had used, with "minor differences at some points." Ms. Gagné was unable to find positives in the samples. Further, Ms. Gagné testified that in the fall of 2011, she re-tested backup tissues she had kept from Dr. Molly Kibenge's samples, using the validated real-time RT-PCR assay developed at DFO Moncton, as well as the Snow segment 8 primers. All those tests were negative.³⁷⁸

Dr. Jones testified that shortly after Ms. Gagné tested the samples in 2004, Dr. Molly Kibenge left PBS and went back to AVC.³⁷⁹

Dr. Gary Marty, Animal Health Centre (BC Lab), 2003–11

During the hearing on salmon farms in August 2011, Dr. Marty testified that his laboratory has tested between 600 and 800 farmed fish every year since 2003 with a “highly sensitive and specific PCR test” for ISAv. All those tests have been negative. He said, “[T]hat [result] gives me a great deal of confidence that we don’t have ISAV in British Columbia.”³⁸⁰

In a May 2011 email from Dr. Marty to Dr. Klotins at CFIA (and similarly in an email from Dr. Marty to Karia Kaukinen, molecular biology technician in Dr. Miller’s laboratory at PBS), Dr. Marty explained that from 2006 to October 2009, the BC Lab used a conventional PCR “designed by our microbiologist ... to target the RNA Polymerase (PB1) gene.”³⁸¹ Since then, the laboratory has used a “Real-time Assay for ISA which targets the matrix protein gene. This test was designed by a masters student that we had working here about 4 years ago.”³⁸² Dr. Marty’s email went on to note that, although the conventional test may have missed detecting some strains, he concluded that the more recent real-time test should pick up all strains – at least as well as tests recommended in the OIE Aquatic Code.³⁸³ In the email to Ms. Kaukinen, Dr. Marty wrote that the positive control used for his lab’s testing is the Canadian (North American) strain of ISAv (i.e., the strain found in New Brunswick), though he said the primers and probes are designed to pick up all known strains.³⁸⁴ Other documentary evidence describing the province’s real-time ISAv assay indicates the test targets a 74 base pair region of segment 8, and is run for 40 cycles. The test was designed, adapted, and validated by BCMAL staff.³⁸⁵

Ms. Gagné testified that, in May 2011, Dr. Klotins asked her to review the primers used by the BC Lab. She did so and found some possible “mismatches with some rarely detected strains of ISA,” but she did not see “any huge problems” with the primers.³⁸⁶

Exhibit 2079 is a spreadsheet showing the BC Lab’s ISAv testing from January to November 2011. The document shows re-testing of all samples tested at the BC Lab (from both the DFO’s audit program and fish submitted to the BC Lab directly from industry) for the 2011 calendar year; it shows the

results of original testing with the BC Lab’s protocol, and retesting with all the OIE-recommended PCR assays. Three samples (out of several hundred) “reacted with” one primer set or another, but, since repeat testing was negative, the document lists all samples as negative for ISAv.

Dr. Kyle Garver, Pacific Biological Station (DFO), 2010–11

As noted above in the section discussing the sockeye health assessment in the Strait of Georgia, Dr. Garver’s laboratory at PBS conducted tests for ISAv on Fraser River sockeye collected during the summers of 2010 and 2011. Documentary evidence before me indicates that he used the DFO Moncton assay and protocol to test for ISAv.³⁸⁷ Dr. Garver’s laboratory tested tissue from 637 anterior kidneys in 2010; all results were negative. As of November 9, 2011, his lab had tested tissue from 232 gills sampled in 2011; all results were negative.³⁸⁸

Ms. Gagné testified that Dr. Garver’s laboratory passed a proficiency test for coming within the NAAHLS for diagnostic testing.³⁸⁹ Documentary evidence (emails exchanged between Dr. Garver’s and Ms. Gagné’s laboratories concerning the proficiency of Dr. Garver’s laboratory in using the validated assay) indicates that Dr. Garver’s laboratory uses the MxPro software – the software used with the Stratagene thermocycler machines.³⁹⁰

Dr. Frederick Kibenge, Atlantic Veterinary College, fall 2011

Dr. Kibenge said he runs 45 cycles on a Roche LightCycler machine. He uses the Snow and others (2006) test (described above), which targets a region of 104 bases (or nucleotides) on segment 8.³⁹¹ He also uses a real-time RT-PCR test targeting segment 6 for genotyping samples that have tested positive using the Snow and others (2006) test.³⁹² Dr. Kibenge relies on the person submitting samples to provide information about the species and provenance of the fish.³⁹³

During the fall of 2011, Dr. Kibenge tested four sample sets of Pacific salmon for ISAv. The first sample set came from Dr. Richard Routledge, a professor at Simon Fraser University (SFU). It comprised tissues from 48 sockeye salmon smolts from Rivers Inlet (SFU samples).³⁹⁴ Dr. Kibenge found

"samples #26 and #36 tested positive for ISAV of the European genotype. All the submitted material for samples #26 and #36 was used up in this testing, and no further testing (e.g., virus isolation and DNA sequencing) was attempted." The Ct values for the segment 8 test were 29.82 for sample #26 and 30.86 for sample #36. The segment 6 Ct values were, respectively, 32.7 and 33.21.³⁹⁵ Dr. Kibenge also attempted, unsuccessfully, to culture ISAV from these 48 samples.³⁹⁶

The other three sample sets were provided to him by Alexandra Morton.³⁹⁷ The second sample set consisted of tissues from 20 fish collected in the Harrison River near Weaver Creek (Harrison River samples).³⁹⁸ Three of these fish – one coho heart, one chum gill, and one chinook gill – tested positive with the segment 8 test (with the respective Ct values of 33.61, 33.77, and 32.99).³⁹⁹ Only the coho heart had a positive segment 6 test (Ct 33.06). Dr. Kibenge attempted to culture virus from the three samples with Ct values. The results were all negative.⁴⁰⁰

The third sample set consisted of sockeye smolts from Okisollo Channel and herring from the south side of Malcolm Island. All these samples tested negative for ISAV.⁴⁰¹ The fourth sample set consisted of sockeye, coho, and pink salmon from the Harrison River. All these samples also tested negative.⁴⁰²

Dr. Kibenge testified that he does not report a positive result until he has "ruled out all possible causes of contamination" so that "by the time we put [out] a result, we are confident that [it] is a true positive result."⁴⁰³ He said he was "confident that the results we got were not as a result of cross-contamination."⁴⁰⁴

Dr. Nylund commented that he thought Dr. Kibenge's results on the first sample set were correct and reliable:

[W]hen you look at Kibenge's results from fish 26 and 36, he gets different Ct values on the different assays. The difference between those Ct values suggests that his findings are correct, because you find exactly the difference you would expect with the two assays he's been using. So, to be honest, I think that Kibenge's results on this are correct.

Unfortunately the material that I look at [discussed below] were so degenerated and so destroyed that it was impossible to reproduce any results at all, but we got one positive. But I – since

it's only one we – positive and it was not possible to repeat, I wouldn't put too much into that. But I think that Kibenge's results are reliable, ...⁴⁰⁵

In contrast, Ms. Gagné testified that because of the high level of degradation in samples that she had seen, "even samples that came directly from Kibenge's lab and that were tested in his lab and reported as PCR positive, ... it is hard to imagine that if there [were] traces of ISA viral genome in there, that it has survived due to that degradation."⁴⁰⁶ She said the positive results from Dr. Kibenge's lab "were produced quickly without the proper time to verify them, confirm them." Also, "just a few precautions to confirm things properly before making a detection like that public would have been a better route."⁴⁰⁷ (In fairness, I note that it was not Dr. Kibenge who made his results public.)

Dr. Are Nylund, University of Bergen, fall 2011

Dr. Nylund runs his screening tests on an ABI 7500 machine using two different assays, a segment 8 test (Snow and others 2006, described above), and a segment 7 test of 84 base pairs (Plarre and others 2005, test described above).⁴⁰⁸

In the fall of 2011, Dr. Nylund tested four sets of samples of Pacific salmon for ISAV.⁴⁰⁹ All samples were submitted to him by Ms. Morton. The first set of samples contained tissues from the same 48 sockeye salmon smolts as in Dr. Kibenge's first sample set. However, Dr. Nylund tested gill tissues while Dr. Kibenge tested heart tissues.⁴¹⁰

On this first sample set, Dr. Nylund initially found no positive results.⁴¹¹ However, because Dr. Nylund knew Dr. Kibenge had positive results for fish #26 and #36, he reran four additional replicas of his tests for those two samples. He obtained one positive result (Ct 36.3 for fish #36 for segment 7). He performed a new extraction of RNA from the remaining gill tissues of samples #26 and #36 and ran five additional replicas, all of which were negative.⁴¹² Dr. Nylund commented in his report that he may not have obtained the same results as Dr. Kibenge "as a result of tissue tropism for ISA virus in *O. nerka* [sockeye], or a combined result of tissue tropism and poor quality of the RNA in the gill tissues sent to us. To my knowledge nothing is known about

the susceptibility of *O. nerka* to ISA viruses, and the tissue distribution of the virus in this species is unknown.”⁴¹³

The second sample set consisted of 16 salmon hearts and gills and five herring hearts collected in British Columbia. All samples tested negative for ISAv.⁴¹⁴

The third sample set consisted of heart and gill tissues from 24 salmonids; the species and location of the samples were not identified in the evidence. Dr. Nylund obtained positive results for segment 7 in one sample of gill tissue. That result was repeatable with Ct values of 34.5 and 35.4. He also obtained one positive result for segment 7 in heart tissue. That result was not repeatable and had a Ct value of 35.5.⁴¹⁵ In his report, Dr. Nylund made the following comment:

None of the samples were positive when using the Uni-ISAV8 assay. As can be seen [sic] from the positive controls both assay have the same sensitivity for detection of ISA virus RNA from European ISA viruses. This fact raises the question: *What are we detecting with the ISA7 Assay?* Based on my experience with both assays a reasonable answer to this question is that we are not detecting any of the known ISA viruses from Europe (or from eastern North America). A more exact answer requires that we are able to sequence the RNA that is targeted by the ISAV7 assay. [Emphasis in original.]⁴¹⁶

The fourth sample set comprised gill tissues from several salmonids collected in British Columbia. None tested positive for ISAv, though Dr. Nylund also tested for IHNV and VHSV and found several samples positive for IHNV.⁴¹⁷

As for whether his positive ISAv results could have resulted from contamination, Dr. Nylund said this:

I had no sign of contamination. I mean, we have a specially designed lab for this kind of work, and I have also been running just as many negative controls as positive tissues. And it was only these tissues that came up positive. But of course I was not able to sequence any ISA virus from these samples. So I was not able to verify that this was actually ISA virus I was picking out. But you know that the assays that

we are using, the real time assay we're using are very specific, so they should only be picking out ISA virus, and maybe not all ISA virus, but most of the ISA viruses that we know.”⁴¹⁸

Nellie Gagné, Gulf Fisheries Centre (DFO), fall 2011

Ms. Gagné runs 40 cycles on a Stratagene machine using a primer probe set developed in-house at DFO, which targets 169 bases on segment 8.⁴¹⁹ Her protocol is CFIA's approved, validated protocol for diagnostic ISAv testing in Canada.

Exhibit 2038 is a chart that Ms. Gagné said was an accurate summary of the testing conducted at DFO Moncton.⁴²⁰ In relation to Rivers Inlet sockeye, the laboratory tested tissues from the same 48 fish tested by Dr. Kibenge and Dr. Nylund. Ms. Gagné's laboratory had the carcasses, which contained some gill tissue, and extracts of kidney homogenate. (At one point Dr. Miller had the kidneys for these fish, as she was going to test them for parvovirus. She turned the kidneys into homogenate, but her test was interrupted by CFIA seeking the tissue from her for ISAv testing.⁴²¹) CFIA inspectors also collected from SFU and sent to the DFO Moncton laboratory 299 fish that had been sampled at the same time as the original 48 fish.⁴²² They also collected and sent to DFO Moncton samples (61 smolts) held at the University of British Columbia (UBC) that were collected around the same place and time as the SFU samples.⁴²³ Finally, DFO Moncton also obtained the 20 heart and gill homogenates from AVC, corresponding to the second sample set tested by Dr. Kibenge.⁴²⁴

None of the tests on the carcasses and gill tissues from the 48 smolts from Rivers Inlet “showed positive results for ISAv by qRT-PCR (samples tested in duplicate).” However, “the reference gene test results indicated compromising RNA degradation on all samples tested, hence the inconclusive result.”⁴²⁵ The laboratory tests on the kidney extracts from the same fish were similarly negative, and “the reference gene test results indicated compromising RNA degradation on all samples tested, hence the inconclusive result.”⁴²⁶

Of the 299 additional fish from SFU, 297 hearts and 157 gills were tested for ISAv. None tested positive. The reference gene test for sample quality on 84 samples indicated “compromising RNA

degradation (hence the inconclusive result) and testing was halted at this point for that reason."⁴²⁷

Test results for the UBC samples are not in evidence.

For the gill and heart homogenates from Dr. Kibenge's second sample set, the DFO Moncton laboratory first tested one heart sample and found it to be negative. Again, owing to sample degradation the result was called inconclusive.⁴²⁸ When DFO Moncton tested the remaining homogenates it obtained one weak positive result (Ct 37.79) in one of the duplicate samples.⁴²⁹ Ms. Gagné testified that normally she would not report this as a positive result. After several attempts, the positive result was not reproducible so she determined it was a false positive.⁴³⁰ Ms. Gagné explained that "there are occasional signals produced that are just fluorescence from the probe, and that's the reason why you should have always your duplicate well showing a result, because a single signal like that could just be non-specific fluorescence."⁴³¹

Ms. Gagné testified that her laboratory attempted to do cell culture from the samples described above and was not successful.⁴³²

Ms. Gagné explained why her lab would, and did, interpret all the test results as "inconclusive":

We reported them as inconclusive based on our policy. Samples are tested additionally for the quality of the RNA tissue, and in this case all samples submitted show extensive to total degradation of RNA. So for that reason we would not reject a positive result if we had found one, we would have investigated and followed our own policies, but in the case of negative results, because of the possible degradation of any material in there, we have to declare the samples inconclusive.⁴³³

Ms. Gagné explicitly adopted as accurate a description of the samples found in an email from Anne Veniot, section head of the Aquatic Animal Health Group in Moncton, to Dr. Stewart Johnson (copied to both Ms. Gagné and Dr. Wright) which said: "Absolutely every sample we received showed signs of degradation ... much more than what allows for conclusive testing."⁴³⁴ Ms. Gagné told me that news releases saying the negative testing was "conclusive" must have contained qualifying statements in the supporting material.⁴³⁵

As Dr. Wright explained in an email to Dr. Johnson, a test might be "negative" from an analytical perspective (i.e., the test was performed and gave a negative result), but from a diagnostic perspective it must be qualified or reported as inconclusive because of the degradation of the test material.⁴³⁶ In testimony, Dr. Wright initially confirmed that "the interpretation of the screening tests that we've done should be considered inconclusive because of the degradation of those samples."⁴³⁷ However, later in his testimony, when confronted with a transcript of a news briefing held December 2, 2011, in which both he and Mr. Stephen called samples from the 48 Rivers Inlet sockeye "negative" rather than "inconclusive," he modified his answer:

Okay. Subsequent to that email [from Anne Veniot, described above], there was [sic] discussions with Anne Veniot, who is the head of section at GFC [Gulf Fisheries Centre] and she agreed that she had answered too quickly and, in fact, based on the testing that was done, although there was degradation, it wasn't nearly as severe as the original samples that we received. So, in essence, what we're saying is the results for those kidney extracts for the 48 of the original are negative, negative analytically and we would interpret them as negative diagnostically.⁴³⁸

When referred to the same chart summarizing the laboratory tests performed at DFO Moncton to which Ms. Gagné testified (and said the "inconclusive" results were correct), Dr. Wright said there were several versions of this chart "and it was corrected for any discrepancies." Further, he said this was not a recent change in interpretation.⁴³⁹ For his part, Mr. Stephen said, "On my understanding from the information I was provided ... those samples were negative."⁴⁴⁰

Dr. Klotins said that it is CFIA's role to interpret Ms. Gagné's results; those results are just one factor in its investigation. She testified that CFIA viewed the results of the 48 kidney extracts as conclusively negative:

[W]e take those test results and we interpret them, given what we know of the possibility of ISA being out there, the possibility that, you know, this is a susceptible species, other

information about ISA. So basically we have an idea already of whether these results can be interpreted with any sort of meaning. As I mentioned to you before, that *not all the results were inconclusive, I need to repeat again that the 48 kidney samples were negative for sure*. And in terms of inconclusive on those 48 fish, inconclusive doesn't mean the samples were not negative, as they're not just sure if they could have been positive. [Emphasis added.]⁴⁴¹

Dr. Kibenge expressed concerns about Ms. Gagné's real-time RT-PCR methods, noting that she runs her machine only for 40 cycles, that she uses the Stratagene system that is associated with higher Ct values (so low infections may be missed if she cuts off the machine at 40 cycles), and that she uses a primer probe set with a long nucleotide sequence that may be less sensitive than the tests used by other researchers.⁴⁴² Ms. Gagné responded that her machine was set to work properly, that she runs only 40 cycles because experience has shown her that nothing usually shows up after that, and that she received the same results when testing samples with both the DFO-validated assay and the Snow and others (2006) segment 8 assay.⁴⁴³

Dr. Kristina Miller, Pacific Biological Station (DFO), fall 2011

Dr. Miller runs 45 cycles and uses a combination of assays targeting segment 8 (roughly 104 bases, 70 bases, and 60 bases) and segment 7 (Plarre and others 2005, described above).⁴⁴⁴ She used two different machines and two different methods to conduct her tests. One of the methods she used, which differs from the methods used by the other witnesses, is run on a machine called a Fluidigm BioMark. She describes this machine as "high output." It allows her to amplify 96 different biomarkers on 96 samples all at once.⁴⁴⁵ To do that, the volumes of samples used are very small, requiring a "pre-amplification" step at a very low primer concentration (1/20th of what is used in a typical assay). This pre-amplification step then allows her to pick up lower copy numbers of viruses more effectively (i.e., at lower Ct values).⁴⁴⁶ She has also run samples on an ABI 7900 machine without a pre-amplification step.⁴⁴⁷ The same positive samples run with the pre-amplification step on the Fluidigm system

began fluorescing at a Ct value of approximately 25, whereas the samples without pre-amplification on the ABI 7900 system began fluorescing at a Ct value of approximately 35.⁴⁴⁸

Dr. Miller testified before me twice. The first time was on August 24 and 25, 2011, when she was called to give testimony about a mortality-related genomic signature (MRS) she had identified in Fraser River sockeye that may be linked to both a parvovirus and pre-spawn mortality in sockeye (see discussion in Volume 2). During the course of that testimony, Dr. Miller said that she had tested MRS-positive fish for ISA.⁴⁴⁹ When she appeared before me the second time, Dr. Miller explained why she went back to retest her samples:

When I testified here before, I talked about running tests for various different known viruses, in association with our mortality related signature, and I had testified that we had tested for ISA and it was negative. And so when I heard about these initial potential positives results, I went back to what we had done previously, and looked at what assay we had used, and realized that we had used an assay to segment 6, which does not necessarily pick up all strains of ISA.

...

So I was concerned that, you know, we hadn't done enough due diligence to make sure that indeed our fish were negative. So I embarked to try to obtain the primers that Dr. Kibenge used, and [the primers] that our DFO validation assay [uses] as well. I was not able to obtain any of those primer probe sets [until mid-December 2011⁴⁵⁰], so we went to the published literature and we got the papers from Plarre, and from Snow and Christiansen paper that was a revision of a segment 8. We ordered five different TaqMan assay primer probe sets, and we started running those on our own fish that we had run on microarrays previously, because of course our question was do we see any indications of ISA in our fish, and do they have any association with our signature?⁴⁵¹

Dr. Miller said that she attempted to get a positive control from within DFO but was not able to get one, and so she ran her assays without one. She said the one advantage of this is that there

was nothing in her laboratory to contaminate her assays: “So if we obtain a positive and are able to sequence a positive, it is a real sequence positive.”⁴⁵² Dr. Miller did indeed find and sequence positive results from four of the five primer sets she used and matched the amplified product to ISAv. She obtained the most positive results using the assay from Plarre and others (2005) for segment 7. The products obtained with this assay were divergent from known ISA strains, but also 95 percent similar to known strains.⁴⁵³ Some short sequence strands detected with a segment 8 assay were 100 percent similar to known Norwegian strains of ISA.⁴⁵⁴ Dr. Kibenge commented that “the fact that [Dr. Miller’s sequences] were obtained without any positive control and when we have blasted the GenBank, which has most of the published ISA virus sequences, I mean, I think that result is credible.”⁴⁵⁵ Dr. Miller compared the sequences she obtained to those that Dr. Molly Kibenge obtained, finding differences between the two sets of sequences.⁴⁵⁶

Dr. Miller initially tested gill and liver tissues from 160 Fraser River sockeye smolts collected in the years 2007–10. She found the greatest prevalence (number of samples infected) in liver tissues using the Plarre and others (2005) segment 7 test (18 percent), and when she combined all the assays she used, the prevalence of positive tests was 25 percent.⁴⁵⁷ In gill tissue, Dr. Miller obtained an overall prevalence of 17 percent positive tests.⁴⁵⁸

Dr. Miller then tested liver tissues from adult Fraser River sockeye (and one subset of pink salmon⁴⁵⁹) from 1986, 1992, 1993, 1999, and 2001, finding positives in all groups, with a prevalence of 5 to 16 percent in different years.⁴⁶⁰ She said, “[T]he patterns of PCR that we observed between the different primer sets were very similar to what we had seen now, where we see a lot of positives for ISA-7 and fewer positives for the ISA-8 primer sets.”⁴⁶¹

Dr. Miller had access to farmed chinook salmon from Creative Salmon, sampled in the winter of 2010. She tested livers and gills from those fish for ISAv. She found Ct values and prevalence (25 percent) similar to the tests she had performed on wild sockeye.⁴⁶² Dr. Miller

noted that, in her positive tests of farmed chinook salmon, gill and liver tissues for the same fish did not necessarily both test positive.⁴⁶³

Dr. Nylund expressed concern about the pre-amplification step that Dr. Miller uses prior to running her samples in the Fluidigm BioMark machine. Although he admitted that he has no experience with that method,⁴⁶⁴ he said that adding the primers to a sample in a pre-amplification step could introduce “artificial genome that could match part of the assay” in the real-time PCR part of the test, causing non-specific amplification.⁴⁶⁵ Dr. Nylund further noted that parts of the sequences obtained by Dr. Miller were 100 percent identical to the primers she used, indicating that she may have been replicating primer, and in one sequence there was a “stop codon”* in a place where it should not be.⁴⁶⁶

Dr. Miller did not agree with Dr. Nylund’s concern about non-specific amplification. She said, “[W]e didn’t make this pre-amplification step up, by the way; this is something that was developed for use in the Fluidigm system.”⁴⁶⁷ She said that, in other testing she has done, she has run tests without a pre-amplification step on the ABI 7900 machine and with a pre-amplification step on the Fluidigm machine and obtained “highly corroborative results.” She said, “I do not believe that pre amp is any issue in terms of getting false sequences.”⁴⁶⁸ Dr. Miller also noted that the concentrations of primers used in the pre-amplification stage were “1/20th of the concentration that anyone would use to amplify the product in a normal reaction.”⁴⁶⁹ Further, she said that once she obtained Ms. Gagné’s primer, she tried to amplify PCR product from her samples using Ms. Gagné’s primers on a conventional PCR, starting with the same pre-amplification step used in her previous tests. She was not able to obtain any positive results with Ms. Gagné’s primers, despite pre-amplification.⁴⁷⁰

Dr. Miller acknowledged there was a stop codon in one of her sequences,⁴⁷¹ but counsel moved on to another question before she could offer further thoughts on why or how that might have occurred.

After Dr. Miller told her colleagues in the Aquatic Animal Health Section at PBS about her

* A stop codon is a nucleotide sequence that normally appears at the end of a coding sequence, not in the middle of a functional protein sequence (Are Nylund, Transcript, December 15, 2011, p. 100).

initial results from testing Fraser River sockeye, they decided to try to replicate her results:

Initially we provided a set of positive and negative blind samples on to Dr. Kyle Garver, who is a virologist that I testified with previously. He's at the Pacific Biological Station, and he ran an assay – he ran basically the same assay that Nellie Gagné has run, the validation assay, and he also ran our ISA-7, the Plarre-7 primer sets that we use, and he – he ran it under two different conditions under their – using the protocol that is part of the validation protocol, and then also using the protocol that we use in our lab.

...

So he ran basically the validated assay that Nellie uses, and the ISA-7 Plarre assay and he was able – he was not able to pick up any positives using the DFO validated assay, but he did pick up a positive of ISA-7 using our assay with our pre-amplification.⁴⁷²

The one positive that Dr. Garver picked up was repeatable in all three replicates.⁴⁷³

Dr. Miller also sent 96 samples of liver tissues to Ms. Gagné's lab for testing with the DFO Moncton's validated assay. Ms. Gagné reported that all these samples tested negative with her assay.⁴⁷⁴

In addition to ISAv testing, Dr. Miller's laboratory has used functional genomics to gain information about the physiological condition of the fish in her laboratory. When Dr. Miller testified in August 2011, she described the microarray technology that allowed her to identify an MRS in Fraser River sockeye. She described it as a molecular tool that allows one to look at tens of thousands of genes in a tissue sample all at once to see which genes are turned on and which genes are turned off. Information about the physiological condition of the fish can be gained by looking at the functions of those genes.⁴⁷⁵ Although it is a novel approach to studying disease, she has used it to look at a number of pathogens.⁴⁷⁶ In November or December 2011, researchers in her laboratory applied these techniques to look for genes that are correlated with the Ct values she obtained for the ISA segment 7 test.⁴⁷⁷ She described the results as follows:

[B]asically what we found was that there was a very strong genomic response to fish that carried this ISAV-7 sequence. And if we did a functional analysis, we looked for what kinds of pathways were being stimulated in that functional response. We found that the very top hit was influenza infection.

So this is an influenza virus, and that really speaks to the fact that these fish are responding in an influenza-like response to this virus.⁴⁷⁸

Dr. Miller went on to say that, although the populations of fish from which she sampled may not be suffering disease and mortality related to ISA, there is a biologically consistent, flu-like response in them to whatever it is she is detecting with the ISA segment 7 test.⁴⁷⁹

Management responses to presumptive positive ISAv test results

CFIA and DFO take no management actions in relation to negative results of ISAv tests. The sections below set out the evidence about steps taken by CFIA and DFO in response to reports of presumptive positive tests for ISAv.

Response to Dr. Molly Kibenge's results

Dr. Jones characterized Dr. Molly Kibenge's results from 2004 as being "some lab results that indicated the possibility of ISA." He said DFO knew the significance of those results:

We were obviously aware of that, so we conducted, and we were aware of the significance of that, as well. This is not something we treated trivially. We conducted a lot of confirmatory tests, and there's – as a result of those tests, we found that we could not confirm the findings. And so as is the result of many things that we look at, we determined that that was a negative result and we carried on.⁴⁸⁰

As noted above, Dr. Jones was of the view that the positive results obtained by Dr. Molly Kibenge

in relation to 64 samples of Cultus Lake sockeye were false positives because the tests could not be repeated consistently by other laboratories. He did not initiate or suggest that further Cultus Lake sockeye be sampled and tested for ISAv, and he was (as of December 2011) unaware if anyone in the virology program at DFO had done so.⁴⁸¹ Dr. Jones also testified that he did not advise local First Nations, who would have assisted in the collection of those spawning Cultus Lake sockeye, about the ISAv results; nor did he advise the Cultus Recovery Team, because he saw no evidence of the disease ISA.⁴⁸² The circle of people within DFO who knew about Dr. Molly Kibenge's results in 2004 was small (see discussion below), and Dr. Jones said he could only speculate that no one initiated a surveillance program to see if she was right because it was "decided [that] this was not significant because of our determination that this was not a positive finding."⁴⁸³

Dr. Jones also testified that, based on "what we know now, there's a very good reason and a highly compelling reason to explore exactly what [the 2003-4] tests were finding." He said:

Had Dr. Molly Kibenge stayed in the lab, this would have been an important part of the further research she would have conducted, is trying to understand why when we send samples to another laboratory that they come back negative, why is that? It would be a very important part of the research, to explore the inconsistencies in the tests that we were using."⁴⁸⁴

Dr. Jones testified that back in 2003-4, his colleague, Dr. Garth Traxler, a virologist, was aware of Dr. Molly Kibenge's results, as was the manager of DFO's diagnostic laboratory at PBS, Dr. Dorothy Kieser. He said that Dr. Garver was hired shortly after Dr. Molly Kibenge left and that he was also aware of her results.⁴⁸⁵ (Dr. Johnson, the current head of the Animal Health Section, was not working at DFO until much more recently.⁴⁸⁶) Dr. Jones testified that, after Ms. Gagné was unable to reproduce Dr. Molly Kibenge's findings, he, Dr. Traxler, and Dr. Kieser decided that the findings "were not representative of ISA."⁴⁸⁷ Dr. Jones said that it was not until mid-October 2011 that he discussed Dr. Molly Kibenge's earlier findings with

his then superiors, "and it was obviously relevant that the documents be included [for disclosure to this Inquiry] at that point."⁴⁸⁸

Correspondence continued between Dr. Jones and Dr. Molly Kibenge until January 2006, in which they discussed the possibility of preparing the results of her work for publication.⁴⁸⁹ Dr. Jones testified that he did not hear from Dr. Molly Kibenge again after January 2006 until November 2011, when she contacted him asking if she could publish the results, and he said "no."⁴⁹⁰ Dr. Jones gave a number of reasons for refusing Dr. Molly Kibenge's request:

The timing seemed to be more than just a coincidence, it was seemingly to take advantage of the events. And it was a surprise to me that when I received the manuscript it hadn't changed since the version that we'd seen in 2004. So it was – it did not mention, for example, the Nellie Gagné results, it didn't clarify the inconsistencies in which the PCR results had been obtained, the difficulty to demonstrate reproducibility, it didn't clarify the results, for example – or it did include, despite the weakness of the sockeye salmon, the Cultus sockeye salmon results, these were posed or presented as positive findings in the paper, and I – I had to judge this work based on my own experiences as a scientist and as an author of a lot of scientific papers, many of which are published in the peer-reviewed literature. I sit on an editorial board of an international journal in fish disease, and I understand what is necessary to maintain, or what are the high standards that are necessary to maintain in order to publish this kind of work, and I felt that this manuscript didn't come close to achieving those standards.⁴⁹¹

Dr. Frederick Kibenge testified that it was he who asked Dr. Molly Kibenge to see if the paper could be published. He said that, when he encountered such a strong reaction from CFIA to his positive ISAv tests, he wanted to make the prior test information available to the agency, but his inclination was to first check with Dr. Molly Kibenge about the publication possibility: "When the information came back that it would not be published, then I thought that at least we could make this information aware to CFIA."⁴⁹²

Dr. Frederick Kibenge also noted the following in relation to the dismissal of Dr. Molly Kibenge's positive test results for ISAv in 2003–4:

What people miss here is that this study was not only doing ISA, it was actually testing for three different viruses. The other two viruses, all the results were negative. But ISA was being done by the same person. So the negative results were quickly accepted. The positive results were considered contamination. If contamination is because of the activities in the lab, the person doing the work, and so on, I wouldn't expect that contamination to be virus-specific, or ISA-specific.⁴⁹³

Response to Dr. Frederick Kibenge's results

Dr. Kibenge made two notifications to report positive findings of ISAv in Pacific salmon to CFIA under the mandatory reporting regime of the *Health of Animals Act*. Those notifications relate to the SFU samples and the Harrison River samples.⁴⁹⁴ He made two further notifications that he was testing for ISAv; as discussed above, those results were negative.⁴⁹⁵

For the first notification related to the SFU samples, Dr. Klotins testified that CFIA took several actions:

- It asked Dr. Kibenge for backup samples that CFIA could test; there were none.
- It started to trace back where the specimens came from, how they were collected, and whether there were related samples.
- It took measures to locate and issue quarantine orders on related samples and have them collected and shipped to DFO Moncton for ISAv testing.
- It identified that some samples from the same specimens went to Dr. Nylund's lab in Norway and requested information about those samples from Dr. Nylund.⁴⁹⁶

On the second notification, involving the Harrison River samples, CFIA took similar actions:

- It requested backup samples from Dr. Kibenge.
- It traced back the samples to determine where

the fish came from, what condition they were in, and whether they exhibited any clinical signs.⁴⁹⁷

Dr. Klotins explained that CFIA knew from the start that confirming positive results in these notifications would be challenging if not impossible because of chain-of-custody concerns. Still, CFIA moved to take control of the samples:

We basically knew right from the beginning we probably wouldn't be able to confirm the results [of positive tests for ISAv that had been conducted by non-government laboratories], but we wanted to get an idea of whether ISAV actually exists out there or not, and which is why we did some of the testing, corroborative testing.

...

[We knew from the beginning we couldn't confirm the results] because we had no oversight on the collection. So the CFIA, because our decisions are very important, can affect multiple stakeholders and partners, including international trade, and because these were wild fish, so it would affect the commercial fishing industry in particular, we need to be very sure that when we make decisions about calling an area or a particular population of fish positive that they truly are positive.

So as part of that process, we provide oversight in the collection, the shipping, in the approved laboratories and so we can be sure of the results applied to those populations in terms of our decision-making[.]⁴⁹⁸

Both Dr. Routledge and Ms. Morton have requested a return of their samples from CFIA.⁴⁹⁹ At the time of the hearings in December 2011, Dr. Klotins said CFIA had not decided whether the samples would be returned.⁵⁰⁰ She said that, if CFIA did not return the samples, this would not have a chilling effect on reporting suspicions of disease to CFIA because "to encourage reporting we do offer compensation for a number of things, including animals that are hurt or destroyed because of sampling," and that compensation could be made to a researcher if their animals were destroyed.⁵⁰¹ As noted above in this chapter, the compensation available under the *Health of Animals Act* is based on the market value of the animal in question minus the value of its carcass. It is difficult to imagine

this formula providing any compensation to Dr. Routledge for sockeye smolts collected in Rivers Inlet, or to Ms. Morton for the dead adult salmon she collected from the Harrison River.

On November 4, 2011, Dr. Klotins suggested to Dr. Con Kiley, acting director of CFIA's Aquatic Animal Health Division and spokesperson on the ISAv issue, that CFIA advise all labs in Canada and the US not to test any more samples of wild finfish from the Pacific Ocean for ISAv.⁵⁰² Dr. Klotins said she made this suggestion out of a concern for chain of custody and a preference to have CFIA oversight of testing, given that CFIA is "by legislation the final arbiter of fish health status in Canada." However, she said her suggestion was not acted upon.⁵⁰³

Also in response to the notifications from Dr. Kibenge, Dr. Klotins said that CFIA "started the investigation of why we couldn't corroborate results."⁵⁰⁴ As early as October 19, 2011, CFIA had put together "[a] small team, which includes staff from the Aquatic Animal Health Division (AAHD), CFIA's Science Branch and DFO" to consider "the assessment of the laboratory at the Atlantic Veterinary College."⁵⁰⁵ I heard evidence about the laboratory assessments conducted by CFIA. While the manner in which the laboratory assessments were conducted was controversial, it is not necessary for me to resolve that controversy. Other evidence I heard has led me to make a recommendation about the relationship between DFO and CFIA.

By October 25, 2011, CFIA had determined that it needed to "start discussing the potential requirements for surveillance activities and design" first within the agency and then including DFO.⁵⁰⁶ CFIA's draft surveillance plan is discussed above in the section on fish health management in wild salmon.

An email written by the acting regional director of CFIA for the BC Mainland and Interior Region, on the day after Canada and British Columbia hosted a joint news conference and technical briefing on ISAv, stated the following:

It is clear that we are turning the PR tide to our favour, – and this is because of the very successful performance of our spokes at the Tech Briefing yesterday, – you [Con Kiley], Stephen [Stephen], Peter [Wright], and Paul [Kitching] were a terrific team, indeed. Congratulations!

One battle is won, now we have to nail the surveillance piece, and we will win the war, also.⁵⁰⁷

When this email was put to Dr. Klotins, she testified that "[w]e may get a little exuberant internally," but there is not a "particular viewpoint that we're following."⁵⁰⁸ Similarly, Mr. Stephen spoke to DFO's perspective on the investigation, saying, "[W]e're not about disproving anything; we're about proving the facts."⁵⁰⁹

Dr. Klotins summarized the status of the CFIA investigations into both Dr. Kibenge's notifications and Dr. Miller's notification (see discussion below) as of the time of the hearings in December 2011:

We've basically [done] all the work on the samples. The results have come back. We've interpreted them as negative at this point, and that was for the first notification. That included the samples from SFU. The same with the second notification from fish that were sampled in Weaver Creek, Harrison River, and we are still continuing our investigation with the two notifications that involved test results from Kristi Miller's lab.

In terms of the samples from SFU, we're in the process of deciding to lift the quarantine orders and making a decision about returning – returning samples as requested by Dr. Routledge, and we're continuing our investigation with the Kristi Miller samples and we're also putting together a surveillance program.⁵¹⁰

Dr. Kibenge testified that, in the fall of 2011, after he reported positive test results for ISAv to CFIA, he felt he was "attacked" by government (though he could "understand where the government is coming from") and that there had been a lot of pressure put on him and his university as a result. He gave his view, based on his past experience in reporting negative results, that he would not have faced similar scrutiny if he had reported negative results of an ISAv test.⁵¹¹

Response to Dr. Miller's results

During the week of November 14, 2011, Dr. Miller advised her superior (Mark Saunders) that her laboratory was conducting ISAv testing on her samples.⁵¹² Two meetings ensued on November 18 and 24, 2011, described by Dr. Miller as follows:

I had two meetings with our Fish Health Group, and the names of the people are listed there [on

Exhibit 2056: Karia Kaukinen, Mark Saunders, Mark Higgins, Kyle Garver, and Stewart Johnson], as well as Mark Saunders, who's the division manager. He called the meetings.

These were meetings to let them know what we were doing and what our results were, and on the November 18th meeting it was simply that first positive sequence that we – I had identified and the PCR results that we had. The second meeting we had more sequence information. Between the first and second meeting, Kyle Garver had taken 10 of our samples and done some testing as well, so he had some results to report.

At the end of the second meeting, because we had had the second segment of ISA that had been sequenced as positive, it was decided that we should contact Ottawa about this, and so Stephen Stephen in Ottawa was contacted, and there was another person in the NAAHP program, but I didn't get the name of that person, that was on the phone call, and we basically told them the results that we had.

There was an ensuing discussion about whether this was really ISA or simply an Orthomyxovirus of some other sort, and a discussion about how one defines an ISA virus compared to, you know, other Orthomyxoviruses ... So anyway, this is an ensuing discussion, but I believe it was decided that if it was the – by definition of the definition that CFIA uses, that it needs to be both cultured and culturable and it needs to validate with their validated primer set. If it doesn't meet those criteria ... then it's not classified as ISA ...

I don't think that Stephen Stephen, in Ottawa, was very pleased that we were doing this testing, because we are not the validated lab. You know, we're – and I tried to explain, you know, we're doing this in a research context, we're looking at a variety of different pathogens, ISA being one of them, and I fully agreed that anything that we get that's positive should be validated in one of their testing labs. But I – basically, there was the feeling that the labs that are not NAAHP labs should not be looking at disease ... There was the general feeling that we shouldn't be looking so closely at disease if we didn't – if we weren't one of the NAAHP labs and didn't understand the ramifications...

[W]e discussed the need to share results with Nellie Gagné's lab, but it was told to me that the decision on whether or not to share this with CFIA was Stephen Stephen's decision to make, not – not certainly mine....

One of the issues that had been brought up, and it had been brought up with Fish Health previously and it was brought up again in these discussions, is that if something is classified as being ISA that CFIA will come and basically take all the samples in the lab away, and as a way – as their way to control for disease spread.

I have a very large genomics program that relies on the very extensive sampling inventory that we have, and I was very concerned that that would be one threat if this was classified as ISA, that I could lose the samples that I rely on for my genomics program.⁵¹³

Dr. Miller said that Mr. Stephen told her that there were "repercussions of new diseases on wild fish and their price and exchange between countries," and that she "should not be undertaking research on something if [she] didn't understand the ramifications of what the results could do."⁵¹⁴ She said no direct restrictions were placed on her research, and that "[n]obody said that I could not continue on with my research, but I think that there was the recognition that this needs to be something that's discussed in the department in the future."⁵¹⁵ She said she felt intimidated:

I personally took a level of intimidation at the idea of my samples perhaps being taken away. I don't know that he meant – you know, I mean, it was said to me by a number of different individuals over again, and of course I did read about what happened to Rick Routledge's samples in his freezer in his graduate students' program when CFIA took away all those samples and they weren't able to continue with the research that they were doing.

Of course, I look at my own program and I think I have a lot to lose here if CFIA decided to sweep in and take all my samples. I've got thousands of samples and a very big program in jeopardy, so whether Stephen Stephens [*sic*] meant that or not, I certainly have been very concerned about that.⁵¹⁶

Further, Dr. Miller said it was “fairly recognized in the department that we weren’t talking about ISA over email.”⁵¹⁷ Dr. Miller also talked about her alienation in the department: “I’m pretty alienated in the department at the moment so the end result of all of this is I’m not included in any conversations about any of this so once I reported this information on the 24th, nobody in the department talked to me about disease or ISA after that.”⁵¹⁸ She clarified that since November 24, she has had discussions with Ms. Gagné about testing samples, but that no one in a managerial position in DFO’s Pacific Region is talking to her about ISA or DFO’s approach or response to ISA issues.⁵¹⁹ Dr. Miller, along with others, received an email from Mr. Saunders on December 8, 2011, attaching a draft research and monitoring plan related to ISA and seeking input to be forwarded to Mr. Stephen.⁵²⁰ Dr. Miller testified that, although she received this email, she was not involved in any conversations related to this proposal.⁵²¹

Mr. Stephen testified that he told Dr. Miller “that coming with results from a research angle without proper confirmation of those results from a diagnostic perspective could have dire consequences.”⁵²² Mr. Stephen further testified as follows:

What I said is that perhaps until CFIA starts their investigation, we should defer further sampling, but I do not have any direct functional or direct authority over Dr. Miller. It was a suggestion, because recognizing trying to chase a number of different results if they’re coming constantly, it makes it hard to follow up on an investigation. I did talk to Mark Saunders several times after that call and suggested that in advance or in preparation for CFIA’s findings we should plan and have a strategic plan about what questions we have to answer based on Dr. Miller’s finding, where we should go with further research, where funding could come from, those sort of things. And Mark Saunders has sent me an e-mail, I believe it was December 8th, relating to referencing that and in consultation with CFIA’s plan for surveillance.⁵²³

Mr. Stephen explicitly did not agree with Dr. Miller’s characterization that she should not be conducting ISA research because she did not

understand the ramifications. He said he told her that “in the context of a reportable disease ... research can tie into regulatory research as we are doing already within the scope of the NAAHP program,” and that he spoke to her supervisor about bringing her research into the regulatory program.⁵²⁴ Although Mr. Stephen does not have any direct functional or reporting authority over Dr. Miller, he does control a large component of her research budget.⁵²⁵ He explicitly did not accept that his remarks could be interpreted as intimidation.⁵²⁶

Mr. Stephen also said he was “surprised that Dr. Miller had not come forward with her original findings – or her findings earlier, because she was obviously aware of an ongoing investigation, and that [it] was important to notify CFIA.” He said that she “had not come forward to CFIA and properly notified them in an appropriate and timely manner.”⁵²⁷ After the call on November 24, Mr. Stephen said he called CFIA and told the agency of Dr. Miller’s results, and left it with the agency to speak to her further.⁵²⁸

Dr. Miller testified that between November 24 and the date she testified (December 15, 2011), she was in contact with CFIA officials about her results.⁵²⁹

Dr. Klotins testified that CFIA was investigating Dr. Miller’s results and subjecting her research methodology to the same scrutiny as for Dr. Kibenge’s laboratory at the AVC.⁵³⁰ That investigation might include an assessment of Dr. Miller’s laboratory – that decision had not been made at the time of the hearing.⁵³¹ Dr. Klotins said: “It would be more an assessment of whether the PCR methodology is providing the information or the results that were presented” so that CFIA can identify areas “where the errors can occur.”⁵³²

Communications and reporting of ISAv test results

Dr. Klotins and Mr. Stephen spoke about Canada’s approach to reporting test results for fish diseases to the public. Dr. Klotins said that the CFIA does not report results right away to the public, “but we did notify our trading partners and we did notify [provincial] government[s] in Canada” after being informed of Dr. Kibenge’s results.⁵³³ Mr. Stephen said he has been working in regulatory reporting and surveillance for 20 years both at CFIA and DFO, and

that “[t]he Government of Canada does not routinely report presumptive or preliminary results until we can confirm those results.”⁵³⁴ Dr. Klotins said that, because the presumptive positives obtained by Dr. Kibenge could never be confirmed because of chain of custody issues, if the results had not been

reported to the media by SFU in a news conference on October 17, 2011, “it is possible the Canadian public would not have known.”⁵³⁵

In the fall of 2011, Canada made a number of different communications about ISA v tests, which are in evidence before me and are summarized below.

October 21, 2011	A CFIA Information Bulletin advised that CFIA in collaboration with DFO was investigating recent reports of ISA in wild sockeye in British Columbia. [Exhibit 2026]
October 24, 2011	<p>The minister of fisheries and oceans and minister of agriculture and agri-food made a joint statement: “After initial investigations, we are concerned that proper protocols may not have been followed in the testing and reporting of these findings. CFIA and Fisheries and Oceans Canada are working to assess the results through scientifically sound and internationally recognized procedures, which must include additional testing to verify the presence or absence of ISA virus in these samples.”</p> <p>The joint statement said that in the last two years DFO has tested over 500 wild and farmed salmon in British Columbia for ISA and that from 2003 to 2010, BCMAL has tested over 4,700 farmed salmon for ISA. All these samples were negative for the virus. [Exhibit 2028]</p>
November 8, 2011	<p>A Government of Canada news release stated, “Based on analysis conducted at the DFO national reference laboratory, there have been no confirmed cases of infectious salmon anaemia in wild or farmed salmon in BC.</p> <p>“DFO has tested all 48 samples received as part of the original investigation and the results are all negative for the virus. These results are consistent with the findings of an independent laboratory in Norway, which also tested samples associated with this investigation and provided a report to the CFIA.”</p> <p>The news release went on to say that over 5,000 BC wild and farmed salmon have been tested by the province and DFO and “none have ever tested positive for the disease.” [Exhibit 2029]</p>
November 8, 2011	<p>CFIA, DFO, and the Province of British Columbia held a joint news conference (which was also referred to by witnesses as a “technical briefing”) to discuss the results of testing to that date. During the course of the briefing, both Mr. Stephen and Dr. Wright confirmed that DFO was calling the 48 kidney samples from the Rivers Inlet sockeye conclusively negative. Dr. Con Kiley from CFIA said that the one positive result that Dr. Nylund obtained from gill tissue of those same 48 fish is considered a negative by CFIA because it was not repeatable.</p> <p>Speakers included Dr. Con Kiley, director, National Aquatic Animal Health Program, CFIA; Mr. Stephen; Dr. Wright; and Dr. Paul Kitching, chief veterinarian officer for British Columbia. [Exhibit 2030]</p>
November 9, 2011	<p>The federal minister of fisheries and oceans (Keith Ashfield) and the provincial minister of agriculture (Don McRae) released a joint statement, referring to the discussion at the technical briefing the day before.</p> <p>Minister Ashfield said in part, “Because some have chosen to draw conclusions based on unconfirmed information, this has resulted in British Columbia’s fishing industry and Canada’s reputation being put at risk needlessly.” He relied on the “over 5000 fresh, properly stored and processed salmon” tested by the province and DFO in the past to say there has never been a confirmed case of ISA in British Columbia.</p> <p>Minister McRae said in part, “Reckless allegations based on incomplete science can be devastating to these communities and unfair to the families that make a living from the sea. Since Premier Clark is currently on a trade mission to China, I have personally asked her to reassure our valued trading partners that now as always BC can be relied upon as a supplier of safe, sustainable seafood.” [Exhibit 2089]</p>

cont'd

November 9, 2011	CFIA issued an information bulletin stating there are no confirmed cases of ISA in British Columbia and repeating information from the November 8, 2011, news release. [Exhibit 2021]
November 10, 2011	CFIA and DFO held a technical briefing for provincial government and industry representatives to discuss "Who are we and what are we doing; Documents on the CFIA website; The CFIA reporting to the OIE; What's different from the normal suspected cases; Investigation to date; Market access issues; Surveillance going forward." [Exhibit 2138]
December 2, 2011	The federal minister of fisheries and oceans (Keith Ashfield) made a statement titled "Negative Infectious Salmon Anaemia Test Results in British Columbia Salmon." He said, "After Canada's reputation has needlessly been put at risk over the past several weeks because of speculation and unfounded science, additional in-depth, conclusive tests, using proper and internationally recognized procedures, are now complete and we can confirm that there has never been a confirmed case of ISA in BC salmon, wild or farmed." He again referred to the over 5,000 fish previously tested by provincial and federal officials. [Exhibit 2004]
December 2, 2011	CFIA released an information bulletin saying, "The Government of Canada in collaboration with the Province of British Columbia has completed testing all samples related to the suspected infectious salmon anaemia investigation in BC. Based on the final results, there are no confirmed cases of the disease in wild or farmed salmon in BC." [Exhibit 2090]
December 2, 2011	CFIA, DFO, and the province held a joint news conference / technical briefing describing test results that DFO Moncton performed on samples related to the first and second sample sets tested by Dr. Molly Kibenge. Speakers included Dr. Kiley, Mr. Stephen, Dr. Wright, and Dr. Kitching. [Exhibit 2032]

Witnesses, particularly Mr. Stephen and Mr. Wright, faced many questions during the hearings about the following:

- why Canada reported inconclusive results as negative results;
- why Canada reported Dr. Nylund's positive results as negative results;
- why Canada omitted any mention of Dr. Kibenge's presumptive positive from samples collected in the Harrison River in the October 24 joint statement of Minister Ashfield and Minister Ritz and during the November 8 news conference; and
- why Canada omitted any mention of Dr. Miller's results during the statements made and news conference held on December 2, 2011.

I discussed the evidence of witnesses about inconclusive results above in the section of this chapter setting out Ms. Gagné's laboratory results.

Specifically in relation to the November 9 joint statement of Minister Ashfield and Minister McRae,

Mr. Stephen said he didn't know how a positive from Dr. Nylund was consistent with negatives from Canada.⁵³⁶ Dr. Klotins said: "That would have been an assessment by the CFIA, an assessment of all the information we had gathered to date, an assessment of whether those findings were true positives or false positives, and also in terms of the negative testing, how confident we could feel in that."⁵³⁷

On the failure to mention the positive results in Dr. Kibenge's second sample set in the October 24 statement, Mr. Stephen said: "Because we do not report, as I mentioned earlier, preliminary results. The results have to be confirmed through our national reference laboratory, and my understanding as of this date there were none of those tests, and as of this date today, none of those tests have been confirmed from our national reference laboratory."⁵³⁸ Similarly, concerning what was said at the November 8 news conference, Mr. Stephen testified before me as follows: "I'll repeat that I was aware of presumptive positive. We had not confirmed that [in the national] reference laboratory ... I'll repeat that we don't share presumptive positives in the normal course of business, no."⁵³⁹

In relation to why there was no mention in the December 2 statement of Dr. Miller's positive results, Mr. Stephen said this:

We were aware of [Dr. Miller's results], but again, as I repeated earlier, those are only preliminary results.

...

Preliminary results are never released. We have to confirm them. We've gone and done tests for the first set of results Dr. Miller produced. We are now going to be producing – trying to confirm the preliminary findings of the second set. We may in fact at some time come across ISA in B.C., and we will report according to these to CFIA. But until such time, preliminary results will not be reported as positives and will not be made public.⁵⁴⁰

I note that none of the government communiqués discussed the results obtained by Dr. Molly Kibenge in 2003–4, or the presumptive positives found by Dr. Nylund in the third sample set he tested. Mr. Stephen did indicate that DFO is aware of multiple sets of presumptive positives, but reiterated that until confirmed those positives do not mean much:

I don't know why people are calling it a crisis. As I've repeated multiple times in the last day and a half that we have not confirmed in any way, shape or form that ISA is actually in B.C. yet. There are presumptive positives, there are suspect positives of results from a number of different laboratories, but we have not been able to confirm, to provide enough information for CFIA to render a decision that ISA is in B.C.⁵⁴¹

I also note that several of the communiqués referred to the tests performed at DFO Moncton as “proper and internationally recognized” procedures, presumably in contrast to procedures used by non-government laboratories. However, the evidence before me is that both Dr. Kibenge and Dr. Nylund's laboratories used internationally recognized tests recommended in the OIE Aquatic Manual. In contrast, both DFO Moncton and the BC Lab used in-house tests that are not – on the evidence before me – internationally recognized in the sense that they are used anywhere outside those specific laboratories. In

DFO's case, the test has been validated according to an OIE validation protocol.

■ Findings

Wild Fraser River sockeye

From my review of evidence about the regulatory tools to address fish health management and the work under way to assess the health of Fraser River sockeye, I conclude that the Department of Fisheries and Oceans (DFO) needs to take a more proactive role in conducting research into the health of wild Fraser River sockeye. The health of wild salmon stocks needs to be DFO's number one priority in fish health matters. DFO's diagnostic work and surveys to support the Canadian Food Inspection Agency's (CFIA) goal of proving Canada's seafood products are safe for trade purposes should not overshadow the department's mandate for the conservation of marine resources.

DFO's conservation mandate includes the mandate to address fish diseases that may threaten wild salmon stocks. It extends beyond reportable diseases to non-reportable diseases, and to the discovery of new and emerging diseases. In my view, DFO should be proactively investigating the possibility of new diseases and developing management plans to address such diseases before they threaten the sustainability of wild stocks. I saw little evidence that DFO is doing this. Indeed, when Dr. Kristina Miller, head of Molecular Genetics, DFO, undertook research on the infectious salmon anemia (ISA) virus outside the “regulatory” National Aquatic Animal Health Program (NAAHP), the response of managers was to try to contain that research and bring it within the NAAHP. Also, I saw no evidence of a clear reporting structure or plan for dealing with emerging non-reportable diseases like heart and skeletal muscle inflammation (HSMI). I see great value in DFO encouraging innovation in its scientists outside the regulatory framework used by CFIA. Such innovation could provide information that may improve the regulatory framework.

The work started in 2010 by DFO under the Program for Aquaculture Regulatory Research (PARR) program, in partnership with

Marine Harvest Canada and the Pacific Salmon Foundation, to survey wild sockeye health appears to be limited to reportable diseases, sea lice, and bacterial kidney disease (BKD). Other diseases that may be of high risk to Fraser River sockeye, such as *Parvicapsula*, may not receive adequate consideration in that survey. As well, work conducted under PARR is, by definition, of short duration (see Chapter 8, Salmon farm management). And so this survey will only provide a snapshot of sockeye health, not trend data. Having said that, I note that work needs to begin somewhere and I am heartened to see DFO taking these first steps.

Overall, I am concerned that in letting its research agenda be influenced by trade concerns, DFO does not give the priority it should to the conservation and protection of wild salmon. DFO should not be a follower on issues of wild fish health; it should be a leader. Ensuring the health of wild stocks should be DFO's number one priority in conducting fish health work.

Managing risks to Fraser River sockeye from salmon farms

As Dr. Michael Kent, professor of microbiology and biomedical sciences, Oregon State University, told me, the focus of much fish health work has been on cultured fish, not wild fish. I also heard evidence from Dr. Laura Richards, regional director, Science, DFO Pacific Region, and others that little work has been done by DFO to investigate the effects of fish farms on Fraser River sockeye. This situation is of concern, especially since the Wild Salmon Policy recognizes the potential risk that salmon farms pose to wild salmon from the "chance of disease and parasite transfer"⁵⁴² and relies on mitigation measures to reduce the risk. Without research to assess the risks, no one can be confident that mitigation measures are effective in reducing them.

I do accept the evidence of Dr. Peter McKenzie, veterinarian and fish health manager, Mainstream Canada, that keeping farmed fish healthy is an important component of reducing the risk to wild sockeye. However, I am concerned that an overemphasis on the health of farmed fish, particularly at the population or farm level, may inadvertently mask risks posed to wild stocks.

Dr. Mark Sheppard, head veterinarian, Aquaculture Environmental Operations, DFO, told me that, despite there being diseased individuals at fish farms, farms may never be diagnosed with a disease because that disease has not risen to a level at which it is a concern for the farmed fish population. Further, more than half the diagnoses of fresh silvers collected in the government auditing program are "open diagnoses," though the fish have obviously died of something. These factors may lead one to conclude erroneously that because farmed fish populations are not suffering, neither are Fraser River sockeye. However, it may be that some level of disease is tolerable in farmed fish populations. I accept the evidence of Dr. Stewart Johnson, head, Aquatic Animal Health, Salmon and Freshwater Ecosystems Division, DFO, that until tests are performed on wild sockeye, scientists will not know the responses of sockeye – at either an individual or population level – to diseases infecting farmed (predominantly Atlantic) salmon. These factors all lead me to the conclusion that the risks to wild sockeye salmon swimming by these farms have not been adequately assessed to date. Again, this relates to the health of wild salmon not being DFO's first priority for fish health management.

Not only did I hear about a lack of research on farmed–wild fish pathogen interaction, I also heard that, where disease concerns or conditions do arise in wild salmon, researchers face difficulties in obtaining samples of farmed salmon in order to test whether farms are the source of these conditions. One such example is in relation to the mortality-related genomic signature and parvovirus identified by Dr. Miller. Industry has resisted providing her with samples of farmed Atlantic salmon so that she can test them. Having mechanisms in place so that farmed salmon could be quickly tested as potential threats to Fraser River sockeye would appear to be in the best interests of DFO's conservation mandate.

Overall, as I discuss further in volumes 2 and 3 of this Report, I am concerned that the risk to Fraser River sockeye cannot be fully mitigated until those risks have been adequately researched and described. Until more is known about the effect of salmon farms on wild sockeye, precautions need to be taken, so that the promise of the Wild Salmon Policy – that risks are addressed – is upheld.

Managing risks to Fraser River sockeye from salmon enhancement facilities

I accept the evidence that disease can occur in hatcheries and that many cases may not be reported or investigated because there are no fish health standards that establish an acceptable level of fish pathogen risk, something that is key for risk assessment. I also conclude that there is a lack of standard practices and there are deficiencies in record keeping at enhancement facilities in relation to disease and fish health.

It may be that the licences implemented in July 2011 start the process of standardizing some of that information. However, given the lack of compulsory language and the relative lack of detail (compared to the requirements placed on salmon farms), something more is needed to assess the adequacy of fish health management practices at hatcheries.

Further, there is no auditing of Fish Health Management Plans (FHMPs) at major DFO and Freshwater Fisheries Society of BC (FFSBC) hatcheries. Community enhancement facilities do not have adequate access to fish health experts and there is a lack of oversight of these facilities regarding their fish health practices. I am also satisfied on the evidence that fish with known and suspected infections have been released from fish production facilities into fish-bearing waters.

The ISAv case study

From the evidence I heard on the limitations and sensitivity of various tests to detect ISAv, I conclude that *if* there is a novel or unknown strain of ISAv in Pacific salmon in British Columbia, none of the current tests may be ideal for detecting it, since they were all developed for Atlantic salmon, and for known genotypes of ISAv.

I accept the evidence of Dr. Frederick Kibenge, chair, Department of Pathology and Microbiology, Atlantic Veterinary College (AVC), that the RT-PCR assay and protocol for ISAv used by the DFO Moncton laboratory, which is the CFIA-approved assay and protocol, *may* not be as sensitive as other tests recommended by the OIE (World Organisation

for Animal Health). Coordination between researchers and a review of the National Aquatic Animal Health Laboratory System (NAAHLS) testing protocols is in order. Dr. Miller's results using a variety of assays indicates that the use of multiple assays may be a better way to screen for ISAv in species of Pacific salmon where the disease is not commonly known or understood; however, I accept the evidence of Dr. Peter Wright, national manager, NAAHLS, DFO Moncton, that Dr. Miller's methods would need to be validated before being used in a diagnostic setting.

I do accept that the DFO Moncton's assay has been validated and may well do the job it was designed to do in detecting known ISAv strains common to Atlantic salmon. However, that does not mean it is a good test for ISAv in Pacific salmon, nor for testing potentially new strains of ISAv. The management preference within DFO to use only the one approved validated test – even in the context of pure research – might prohibit research that identifies a better way to test Pacific salmon like sockeye for diseases such as ISA.

As discussed further in Volume 2 of this Report, I cannot conclude on the evidence before me whether ISAv or an ISAv-like virus at present exists in Fraser River sockeye. The expert opinion is mixed, and there is clearly much more work to be done. Although functional genomics work stemming from Dr. Miller's laboratory indicates that positive tests for ISAv appear to be associated with a flu-like response, this work is at a very early stage. I cannot make any conclusions on the evidence about what effect this virus, if it exists, has on Fraser River sockeye.

Several aspects of the management response to the presumptive positive ISAv tests by Dr. Molly Kibenge, Dr. Frederick Kibenge, and Dr. Miller give me cause for concern. First, the only response to Dr. Molly Kibenge's work showing a significant prevalence of presumptive positives for ISAv appeared to be to have some of the samples retested, both by Dr. Frederick Kibenge at AVC and then by Nellie Gagné, molecular biology scientist and laboratory supervisor, Molecular Biology Unit, DFO Moncton. When Ms. Gagné's results came back negative, researchers at DFO who were aware of the results decided Dr. Molly Kibenge's results were false positives.

They did not implement any further testing of wild salmon in British Columbia. They did not continue an investigation into methodologies until they determined why different laboratories got different results. They concluded that the results must have been false positives.

Second, the response within DFO to Dr. Miller's results is especially puzzling to me. Mr. Stephen Stephen, director, Biotechnology and Aquatic Animal Health Sciences Branch, DFO, told me he suggested that she defer any further work and that her work should be brought into the regulatory program led by CFIA. This move, in my view, would diminish the value of her work. As I said

above, if DFO restricts its research into fish health on wild salmon to meet the needs of one "client" (CFIA), it jeopardizes its ability to be innovative and risks failing in its mandate to conduct research that will further scientific knowledge about the health of wild sockeye salmon.

Finally, the public statements made in the fall of 2011 left the impression that all was well – that there was no reason to be concerned about ISAv in wild BC salmon. At a minimum, there was a strong case for further research before that conclusion could be drawn.

I discuss these findings and any related recommendations in Volume 3 of this Report.

Notes

- 1 Commission's Interim Report, pp. 7–8, available at www.cohencommission.ca.
- 2 *Health of Animals Act*, SC 1990, c. 21; *Fisheries Act*, RSC 1985, c. F 14.
- 3 Exhibit 1676; Exhibit 2134.
- 4 PPR 20, pp. 102–3.
- 5 Exhibit 2092, p. 9.
- 6 Exhibit 1449, p. 19.
- 7 Exhibit 2011.
- 8 Peter Wright, Transcript, December 16, 2011, pp. 99–100.
- 9 Kim Klotins, Transcript, December 16, 2011, pp. 142–43; Exhibit 1676, pp. 11–12.
- 10 Kim Klotins, Transcript, December 19, 2011, pp. 7, 13.
- 11 Exhibit 1676.
- 12 Peter Wright, Transcript, December 16, 2011, pp. 102–3.
- 13 Exhibit 2117, p. 1.
- 14 Peter Wright, Transcript, December 16, 2011, pp. 138–39.
- 15 Peter Wright, Transcript, December 16, 2011, p. 97.
- 16 Peter Wright, Transcript, pp. 102–3.
- 17 Exhibit 2134.
- 18 *Health of Animals Act*, SC 1990, c. 21; Kim Klotins, Transcript, December 16, 2011, p. 130.
- 19 *Health of Animals Act*, SC 1990, c. 21, s. 2.
- 20 Exhibit 2128, p. 1.
- 21 *Reportable Diseases Regulations*, SOR/91 2.
- 22 *Reportable Diseases Regulations*, SOR/91 2, Schedule 2.
- 23 Exhibit 2128, p. 1.
- 24 *Health of Animals Regulations*, CRC, c. 296, Schedule VII.
- 25 Exhibit 2105, p. 9.
- 26 *Health of Animals Act*, SC 1990, c. 21, s. 5(1).
- 27 *Health of Animals Act*, SC 1990, c. 21, s. 8.
- 28 Transcript, December 16, 2011, pp. 132–33.
- 29 Exhibit 2027; Exhibit 2103.
- 30 Kim Klotins, Transcript, December 16, 2011, p. 133.
- 31 Transcript, December 16, 2011, p. 90; see also Exhibit 2025.
- 32 Transcript, December 16, 2011, p. 91.
- 33 *Health of Animals Act*, SC 1990, c. 21, s. 38.
- 34 *Health of Animals Act*, SC 1990, c. 21, s. 41(2).
- 35 *Health of Animals Act*, SC 1990, c. 21, s. 35.
- 36 *Health of Animals Act*, SC 1990, c. 21, s. 51.
- 37 *Health of Animals Act*, SC 1990, c. 21, s. 14.
- 38 *Health of Animals Regulations*, CRC, c. 296, s. 196.
- 39 *Health of Animals Regulations*, CRC, c. 296, s. 196.
- 40 *Pacific Aquaculture Regulations*, SOR/2010 270.
- 41 *Fish Health Protection Regulations*, CRC, c. 812.
- 42 *Pacific Aquaculture Regulations*, SOR/2010 270, s. 2.
- 43 *Pacific Aquaculture Regulations*, SOR/2010 270, ss. 4, 5.
- 44 Exhibit 1594.
- 45 Exhibit 1594, Appendix III, pp. 7–8.
- 46 *Fish Health Protection Regulations*, CRC, c. 812, s. 2.
- 47 *Fish Health Protection Regulations*, CRC, c. 812, ss. 4, 5.
- 48 *Fish Health Protection Regulations*, CRC, c. 812, ss. 2, 6.
- 49 Transcript, December 16, 2011, pp. 130–31.
- 50 Transcript, December 16, 2011, p. 131.
- 51 Transcript, December 16, 2011, p. 131.
- 52 Kim Klotins, Transcript, December 16, 2011, pp. 131–32.
- 53 PPR 20, Aquaculture, p. 81.
- 54 PPR 20, pp. 81–82.
- 55 Trevor Swerdfager, Transcript, August 31, 2011, pp. 32–33.
- 56 Transcript, August 31, 2011, p. 32.
- 57 PPR 20, pp. 83–84.
- 58 PPR 20, p. 84.
- 59 Transcript, August 25, 2011, pp. 58–59.
- 60 Peter McKenzie, Transcript, August 31, 2011, p. 30.
- 61 PPR 20, p. 54.
- 62 Transcript, December 16, 2011, pp. 136–37.
- 63 Exhibit 2127, p. 9.
- 64 Transcript, December 16, 2011, p. 85.
- 65 Transcript, December 16, 2011, p. 86.
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- 67 Transcript, December 16, 2011, p. 87.
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- 69 Exhibit 2073.
- 70 PPR 20, p. 53.
- 71 Transcript, December 19, 2011, p. 108.
- 72 Transcript, December 19, 2011, p. 109.
- 73 Exhibit 2105, p. 158.
- 74 Exhibit 2023, p. 3.
- 75 Exhibit 2024, p. 5.
- 76 Exhibit 2105, p. 8.
- 77 Transcript, December 16, 2011, p. 94; see also Exhibit 2106.
- 78 Transcript, December 16, 2011, p. 97.
- 79 Transcript, August 25, 2011, pp. 32–33.
- 80 Michael Kent, Transcript, August 22, 2011, p. 10.

- 81 Michael Kent, Transcript, August 22, 2011, pp. 11–12;
Stephen Stephen, Transcript, August 22, 2011, p. 15.
- 82 Transcript, August 22, 2011, pp. 37–38.
- 83 Stewart Johnson, Transcript, August 22, 2011, pp. 12–13.
- 84 Transcript, August 22, 2011, p. 16.
- 85 Stewart Johnson, Transcript, August 22, 2011, p. 32.
- 86 Transcript, August 22, 2011, p. 39.
- 87 Transcript, September 23, 2011, p. 5.
- 88 Transcript, September 23, 2011, p. 4.
- 89 Transcript, September 26, 2011, pp. 64–65.
- 90 Transcript, August 22, 2011, pp. 35–36.
- 91 Transcript, August 22, 2011, p. 36.
- 92 Exhibit 1449, p. 20.
- 93 Transcript, September 26, 2011, pp. 63–65.
- 94 Transcript, September 26, 2011, p. 67.
- 95 Transcript, September 26, 2011, pp. 62–63.
- 96 Exhibit 2127, p. 9.
- 97 Transcript, December 15, 2011, p. 131.
- 98 Exhibit 1452.
- 99 Exhibit 1452, p. 3.
- 100 Transcript, August 22, 2011, p. 36.
- 101 Transcript, August 22, 2011, pp. 69–70.
- 102 Exhibit 1452.
- 103 Transcript, August 22, pp. 52–53.
- 104 Exhibit 1461, p. 8.
- 105 Exhibit 1461, p. 9.
- 106 Exhibit 1461, pp. 9, 12.
- 107 Exhibit 2112.
- 108 Transcript, December 19, 2011, p. 78.
- 109 Transcript, December 19, 2011, p. 58.
- 110 Transcript, December 19, 2011, pp. 8, 58, 60, 78.
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- 114 Exhibit 2112, p. 6.
- 115 Exhibit 2112, pp. 6–7.
- 116 Exhibit 2119, pp. 2–3.
- 117 Kristina Miller, Transcript, December 15, 2011, p. 135.
- 118 Kristina Miller, Transcript, December 15, 2011, p. 136.
- 119 Transcript, December 15, 2011, p. 138.
- 120 Transcript, August 25, 2011, pp. 11–12.
- 121 Transcript, August 25, 2011, pp. 12–13.
- 122 Kristina Miller, Transcript, August 25, 2011, p. 13.
- 123 Transcript, December 15, 2011, pp. 102–3.
- 124 Transcript, December 15, 2011, p. 140.
- 125 Transcript, December 15, 2011, p. 126.
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- 129 Transcript, August 23, 2011, pp. 42, 43, 46.
- 130 Michael Kent, Transcript, August 23, 2011, p. 42.
- 131 Transcript, August 23, 2011, p. 43.
- 132 Transcript, August 26, 2011, pp. 28–29.
- 133 Transcript, August 29, 2011, p. 101.
- 134 Transcript, August 31, 2011, p. 66.
- 135 Mark Sheppard, Transcript, August 31, 2011, p. 93.
- 136 Andrew Thomson, Transcript, September 1, 2011, p. 52.
- 137 Mark Sheppard, Transcript, August 31, 2011, pp. 93–94.
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- 140 Exhibit 1594.
- 141 Exhibit 1611.
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- 143 Exhibit 1611, pp. 3–5.
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- 149 Exhibit 1661.
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- 152 Transcript, August 31, 2011, p. 18.
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- 154 Peter McKenzie, Transcript, August 31, 2011, pp. 19–20.
- 155 Transcript, August 31, 2011, pp. 21–22.
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- 157 Gary Marty, Transcript, August 31, 2011, p. 22.
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- 165 Transcript, September 26, 2011, p. 42.
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- 167 PPR 20, p. 33; Mark Sheppard, Transcript, August 31, 2011,
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- 169 Mark Sheppard, Transcript, August 31, 2011, pp. 26–27.
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- 174 Exhibit 1560, p. 4.
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- 176 Exhibit 1560, p. 5.
- 177 PPR 20, p. 41.
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- 179 Exhibit 1668, p. 3.
- 180 Transcript, August 22, 2011, p. 93.
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- 183 Exhibit 1665.
- 184 Mark Sheppard, Transcript, August 31, 2011, p. 40.
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- 188 Gary Marty, Transcript, August 31, 2011, p. 55.
- 189 Transcript, August 31, 2011, pp. 46–47.
- 190 Transcript, August 31, 2011, pp. 45–46.
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- 194 Mark Sheppard, Transcript, August 31, 2011, pp. 85–86.
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- 206 Transcript, August 23, 2011, p. 15.
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- 211 Transcript, August 29, 2011, pp. 8–9.
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 225 Sonja Saksida, Transcript, September 6, 2011, p. 22.
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 241 Transcript, August 29, 2011, pp. 77-78.
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 256 Transcript, September 8, 2011, pp. 18-19; see also Exhibit 1805.
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 258 Transcript, September 8, 2011, pp. 13-14.
 259 Clare Backman, Transcript, September 8, 2011, p. 14.
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 263 Richard Beamish, Transcript, July 7, 2011, pp. 83-84; Exhibit 1323, p. 437.
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 271 Transcript, August 22, 2011, p. 80; Exhibit 1454, p. 105.
 272 Craig Stephen, Transcript, August 23, 2011, pp. 77-78; see also Exhibit 1454, pp. 92-93.
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 274 Transcript, August 22, 2011, p. 80; Exhibit 1454, p. 103.
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Chapter 10 • Wild Salmon Policy

My Terms of Reference require me to address the future sustainability of the Fraser River sockeye fishery. *Canada's Policy for Conservation of Wild Pacific Salmon* (2005) (known as the Wild Salmon Policy, or WSP) is of particular relevance in this assessment because it was developed to change the approach of the Department of Fisheries and Oceans (DFO) to conservation and management of the resource.

The previous chapters of this Report have addressed various components of management relevant to Fraser River sockeye, including the organization of the department, applicable policies, management of the harvest, and management of fish habitat. The Wild Salmon Policy (see Appendix B) has been put forward as a new approach to integrate all these components and to provide guidance and focus for DFO as it manages all the Pacific salmon. Although the focus of this Inquiry was Fraser River sockeye, the WSP applies to all Pacific salmon species, many (if not all) of which coexist at some point in their life cycles with Fraser River sockeye. This chapter will necessarily focus on the Wild Salmon Policy as it relates to Fraser River

sockeye, but the challenges and issues raised will at times reflect the application of the policy in a more general way.

The June 24, 2005, press release announcing the policy quotes Minister Geoff Regan as saying, "The Wild Salmon Policy significantly transforms the management and conservation of wild salmon, their habitats and dependent ecosystems."¹ Claire Dansereau, deputy minister, described the Wild Salmon Policy as an essential policy for DFO, "a priority policy on the West Coast," and DFO's "guiding document for the management of Fraser sockeye."² Pat Chamut, former assistant deputy minister, described the policy this way:

[T]he Wild Salmon Policy is probably one of the few things that actually meets the definition of transformative. It is fundamentally changing the management of wild salmon ... I've dealt with management of Pacific salmon since probably 1985 through till I retired in one form or another, and it was always fraught with inevitable conflict and debate over what are we

trying to conserve? How much are we trying to conserve? And how are we going to do it?

...

[I]t really lays to rest a longstanding issue about what we're trying to conserve. And I'm absolutely convinced that the policy with the way it defines conservation, the way it defines ... how sustainable use will be achieved and how we're going to proceed in terms of an integrated, strategic sort of watershed plan, I think it is transformative. I believe it is a very strong policy that provides a good foundation for the department to meet its objectives for Pacific salmon.³

According to Susan Farlinger, regional director general, Pacific Region, the Wild Salmon Policy is "the most explicit description of what [DFO] means when it says conservation is the highest priority of [DFO] ... it is something that sits at the centre of the other policies because it defines for us how we intend to or want to implement our first priority, which is conservation." It expresses "how we're going to implement the Precautionary Approach for salmon."⁴ For further discussion of the precautionary approach, see Chapter 3, Legal framework.

The Wild Salmon Policy sets out an integrated approach to the management of wild salmon on the Pacific coast, including the gathering of information relating to salmon and salmon habitat and planning for conservation and harvest. Its goal is stated to be "to restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people in Canada in perpetuity."⁵ The WSP sets out six strategies, all of which are to be implemented by specific action steps:

- Strategy 1: Standardized monitoring of wild salmon status
- Strategy 2: Assessment of habitat status
- Strategy 3: Inclusion of ecosystem values and monitoring
- Strategy 4: Integrated strategic planning
- Strategy 5: Annual program delivery
- Strategy 6: Performance review

In this chapter I discuss the efforts made by DFO to implement the policy, the challenges faced by DFO in implementation, and the impact of implementing the policy on Fraser River sockeye and the sustainability of the fishery. The challenges related

to the WSP include incomplete implementation; lack of funding to implement the policy; reliance on reductions in harvest rate to protect stocks at risk, without exploring alternative measures such as habitat restoration; and lack of socio-economic considerations in integrated planning.

The Wild Salmon Policy originated in DFO's New Directions suite of policies of the late 1990s and early 2000s.⁶ As described in Chapter 4, DFO overview, New Directions set out Canada's conservation mandate for Pacific salmon, and the Wild Salmon Policy became a key component of that mandate. A *New Direction for Canada's Pacific Salmon Fisheries* (New Directions Policy, October 1998) states, as Principle 1, that "[c]onservation of Pacific salmon stocks is the primary objective and will take precedence in managing the resource," and continues as follows:

The new conservation ethic involves ensuring that adequate numbers of salmon spawn each year, that successful reproduction takes place and that genetic diversity is maintained. Effective conservation of salmon also requires that harvest management be integrated with production management on a watershed basis. Habitat and enhancement planning should complement harvest management and ensure escapement goals are consistent with the productive capacity of the habitat.

Ultimately, conservation goals must be established at levels that optimize productive capacity and benefits to the people of Canada. To accomplish these goals integrated watershed plans will be prepared in consultation with public stakeholders.

...

This document sets out the broad policy direction associated with a new approach to the Pacific salmon fisheries. Based on this direction, a detailed set of operational policies for the management of the salmon resource will be developed. Consultations with the public, communities and stakeholders will now begin. The Government of British Columbia will be included in this process. These policies will cover the full range of activities involved in the management of the resource, including salmon allocation, selective fishing, and a wild fish policy.⁷

DFO also described the development of the Wild Salmon Policy as its response to criticisms set out in

reports from the Office of the Auditor General in 1997, 1999, 2000, and 2004. In Chapter 20 of the 1999 report, entitled *Pacific Salmon: Sustainability of the Fisheries*, one of the recommendations stated that DFO should “facilitate the application of the precautionary approach to salmon fisheries management by establishing catch levels and conservation limits for individual stocks or groups of stocks.”⁸ DFO responded:

This recommendation is consistent with the Wild Salmon Policy now under development by the Department. The policy, which is based on the precautionary approach, will establish escapement levels and target harvest rates that will ensure long-term sustainability. This work goes hand-in-hand with the requirement to establish conservation units and will be a central feature of departmental science input to fisheries management.⁹

Similar recommendations were made in a previous audit in 1997, and in subsequent audits in 2000 and 2004.¹⁰

I also heard evidence on how the Wild Salmon Policy helped to maintain biodiversity within the species. Dr. Brian Riddell, former division manager, Salmon Assessment and Freshwater Ecosystem Division, Science Branch, DFO Pacific Region, was one of the early authors of the policy. In his testimony, he spoke of the importance of biodiversity in Pacific salmon: “[I]t’s that diversity of Pacific salmon that allows them to widely utilize the habitat[;] it provides both the opportunity for maximizing production throughout all the habitat, as well as provid[ing] the genetic diversity required for adaptation through time.”¹¹ Dr. Riddell’s evidence complements that of Mike Lapointe, chief biologist, Pacific Salmon Commission, who described the importance of biodiversity by analogy to an investment portfolio:

In terms of why it’s important, a whole host of reasons. But primarily because these stocks do have different traits, and those traits may confer them some survival advantage to particular environmental factors or other factors that affect them. It’s very much analogous to ... a stock portfolio. If you have some populations that do better in some circumstances than others, then having a very diverse portfolio means that your group of populations is much more likely

to persist in the event that there is some set of environmental factors that would threaten their existence. A good example would be something like climate change. Some of these populations may very well be more robust to warmer temperatures in adverse conditions than others ... From a species sustainability perspective, diversity is definitely an advantage.¹²

According to Dr. Riddell, there is “no question that diversity in Pacific salmon is essential for their continuance and for sustainable benefits,” and that the Wild Salmon Policy developed from an evolving awareness of the importance of protecting biodiversity.¹³

In testimony relating to Technical Report 9, Climate Change, one of the co-authors, Dr. Scott Hinch, provided an example of a benefit of maintaining biodiversity. He said that some salmon stocks may have already reached their evolutionary capacity to adapt to climate change, raising the question as to whether efforts should be made to conserve such stocks. He also said, however, that it was “paramount to protect as many populations as possible, because we don’t know what environmental conditions are going to change ... in all the different life stages, and there will be some populations that may be able to cope particularly well.”¹⁴

Dr. Riddell outlined how the period from 1980 to 2000 saw major changes in scientific thinking about the importance of biological diversity in resource management.¹⁵ These two decades represented a significant period of reassessment in fisheries science, with changes to salmon fisheries developing especially since the mid-1990s. It featured new international treaties – the Pacific Salmon Treaty (1985) and the *Convention on Biological Diversity* (1992) – as well as key scientific developments and major environmental events. Such changes “occurred with a broadening development of Canada’s salmon enhancement program and associated debates, listings of Pacific salmon under the *Endangered Species Act* in the United States, the development of wild salmon policies and recovery programs in Washington State, Oregon, and California, and the heightened debate between users within Canada under the Pacific Salmon Treaty,” as well as “increasingly vocal environmental concerns about biodiversity and ecosystems.”¹⁶

In his testimony, Dr. Riddell identified three principles that he believed needed to be

incorporated into managing salmon diversity. First, because evolution is a continuous process, the adaptability of salmon must be maintained. Second, salmon genetic diversity develops in the context of habitat and ecological diversity, and the connections among salmon, habitats, and ecosystems are natural and required. Third, maximizing salmon production and salmon diversity are consistent objectives, and management debates about the “trade-off” between these values are actually about the rate of use, and not total production.¹⁷

Dr. Riddell was asked whether he agreed that the degree of biological diversity that should be conserved was a question for society, rather than a purely scientific question. He replied that, although he would have a primarily biological perspective, the Wild Salmon Policy acknowledges other perspectives in its integrated planning process (Strategy 4), where “[t]here are choices to be made in how much of the diversity will be sustained at what cost.”¹⁸

In discussing Cultus Lake sockeye, Dr. Carl Walters, professor of applied ecology and fisheries population dynamics at the University of British Columbia, noted that, where smaller, vulnerable stocks – for example, Cultus Lake sockeye – are harvested together with big stocks, a trade-off decision has to be made “whether it’s worth trying to protect these small stocks, the small and unproductive stocks.”¹⁹

The Wild Salmon Policy expressly states that all decisions and activities pertaining to the conservation of wild Pacific salmon will be guided by the following four principles:

Principle 1 – Conservation – Conservation of wild Pacific salmon and their habitats is the highest priority in resource management decision-making ...

Principle 2 – Honour Obligations to First Nations – Resource management processes and decisions will honour Canada’s obligations to First Nations ...

Principle 3 – Sustainable Use – Resource management decisions will consider biological, social, and economic consequences, reflect best science including Aboriginal Traditional Knowledge (ATK), and maintain the potential for future generations to meet their needs and aspirations ...

Principle 4 – Open Process – Resource management decisions will be made in an open, transparent and inclusive manner.²⁰

Figure 1.10.1 from the Wild Salmon Policy usefully illustrates its guiding principles, strategies, objectives, and ultimate goal.

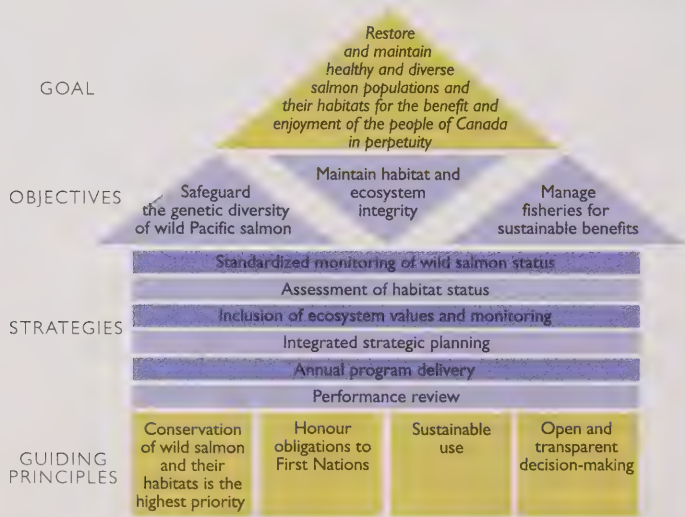


Figure 1.10.1 Overview of the Wild Salmon Policy

Source: Exhibit 8, p. 8.

■ Development of the Wild Salmon Policy

Development of the Wild Salmon Policy began in DFO's Science Branch in the Pacific Region.²¹ Mark Saunders, former WSP coordinator and current head, Salmon Assessment and Freshwater Ecosystems (SAFE), DFO Science, became involved with developing the WSP in April 2003, when he was posted to the Policy Branch as the WSP coordinator, a position he held until 2007. With Mr. Saunders's appointment, DFO established a cross-sectoral WSP development team, with some direction from a WSP steering committee of regional directors. The team included Dr. Jim Irvine, research scientist with DFO Science; Dr. Riddell; Sandy Fraser, from Fisheries and Aquaculture Management (FAM); Andrew Thomson, the lead on aquaculture issues; and Carol Cross, from the Oceans, Habitat and Enhancement Branch (OHEB).²² Ms. Farlinger, then regional director of OHEB, was also involved, working closely with Mr. Chamut later in the development of the policy.²³

In January 2004, at the request of the deputy minister, Mr. Chamut was appointed as a special advisor on the WSP. For the next 18 months, he worked in the Pacific Region to finalize the development of the policy.²⁴ He noted that, during development, he served as a "focal point," responsible only for the Wild Salmon Policy and able to dedicate all his time and effort to it, supported by a team of people.²⁵

Mr. Saunders said it was important to have somebody in a position of authority tasked with finalizing the WSP.²⁶ He outlined a range of contentious issues in 2003: what to conserve; what level of biodiversity DFO would commit to manage and protect; how to apply the precautionary approach, including whether DFO should be prescriptive or should move toward non-prescriptive benchmarks; and the definition of conservation.²⁷

A key challenge was to determine the process for making trade-offs between biological and conservation objectives, and between social and economic objectives. DFO needed to identify "when social and economic considerations would come into play on varying ends of the spectrum of abundance" and to consider situations where, because of the high costs and the social and economic impact, "there may be a rationale for not opting to continue or make large effort[s] to maintain a conservation unit."²⁸ In the final Wild Salmon Policy, DFO moved to a sustainable-use principle that was aimed simultaneously at achieving both conservation and economic goals.²⁹

Defining "conservation"

The WSP development team agreed on the need to ensure that a wild salmon policy protected the genetic diversity of Pacific salmon. In Mr. Chamut's words, "[T]he basic goal of protecting genetic diversity was one that did need to be embraced and did need to be the cornerstone of the policy," while still allowing for socio-economic considerations.*

Dr. Riddell explained that the scientists involved in developing the policy were concerned not only with conservation. They realized that "you can't have sustainable use without sustained resources, and conservation comes first in terms of having a healthy natural resource base ... that's the fundamental goal of the Wild Salmon Policy, so that you have a healthy resource base upon which you can have multiple uses, not just fishing."³⁰

Clarifying the definition of "conservation" and its practical application to salmon fisheries was a critical focus of First Nations' input. Mr. Chamut said that First Nations had strong views on this issue because conservation is important in their communities and also because Canadian courts have prioritized conservation over First Nations'

* Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. As discussed further in Volume 3, Chapter 3, Legislative amendments, Bill C-38 amends the *Fisheries Act* to focus on the protection of fish that support commercial, recreational, or Aboriginal fisheries. This focus on fisheries, as opposed to conservation, may signal a change of direction from the understandings developed during the conception and drafting of the WSP, as discussed in detail in the next sections of this chapter. If all Pacific salmon are included within the definition of "fish that support commercial, recreational or Aboriginal fisheries," the impact on the WSP may be felt primarily in the changes to habitat protections, as discussed in Chapter 3. If fisheries are defined at the Conservation Unit level (which will be discussed in the following section), the changes to the Act may be contrary to the protection of genetic diversity, the "cornerstone of the policy." Transcript, November 30, 2010, p. 15; December 1, 2010, p. 50; see also Exhibit 8, pp. 9–12.

right to harvest fish for food, social, and ceremonial purposes. He testified that, without a clear definition of conservation, “talking broadly about our responsibility and our mandate being conservation, it’s meaningless without actually defining ... what it is you’re trying to conserve and at what level you’re trying to conserve it.”³¹

The definition of conservation was debated within the WSP development team throughout the spring of 2005.³² Mr. Chamut set out two alternatives in an email of March 29, 2005: a definition of conservation that excluded sustainable use, based on a proposal by Dr. Riddell, and a definition that included sustainable use, one more consistent with an earlier draft policy from December 2004.³³ Mr. Chamut explained that the two alternatives reflect

a basic discussion about how do you define conservation and how that pertains to sustainable use ... We received an awful lot of comments from a lot of different groups that are involved or interested in the fishery and one of the concerns that was expressed was that there was seemingly a conflict in the policy between conservation and use.³⁴

In the end, the development team decided to define conservation separately from and without reference to sustainable use. Mr. Chamut testified that this decision was a fundamental issue informed by input from a variety of groups, and he concluded by stating: “[W]e wanted to be absolutely clear that conservation was the top priority and it wasn’t going to be compromised for meeting sustainable use objectives.”³⁵

The terms “conservation” and “sustainable use and benefit” are both defined in the policy:

Conservation. The protection, maintenance, and rehabilitation of genetic diversity of species and ecosystems to sustain biodiversity and the continuance of evolutionary and natural production processes.³⁶

Sustainable Use and Benefit. The use of resources in a way and at a rate that does not lead to their long-term decline, thereby main-

taining the potential for future generations to meet their needs and aspirations. Sustainable use refers to consumptive uses of biological resources. Sustainable benefits, on the other hand, derive from a broader range of consumptive and non-consumptive resource uses.³⁷

These definitions were not accepted by all resource users, as I discuss below.

Conservation Units

Another fundamental question for the WSP development team was the level of salmon diversity DFO should commit to manage and conserve. The department decided to protect a level of biodiversity called a Conservation Unit (CU), defined in the WSP as “[a] group of wild salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to recolonize naturally within an acceptable timeframe.”³⁸

Dr. Riddell testified that a CU is a genetic lineage that, if lost, would be irreplaceable.³⁹ In the context of sockeye, most evidence suggests that, once lost from a habitat, sockeye production cannot be restored, as sockeye have genetically developed for specific lake systems. Efforts at transferring a new sockeye population into a habitat previously used by a different sockeye population have been largely unsuccessful. “Essentially,” he said, “each sockeye CU is irreplaceable.”⁴⁰

According to Dr. Riddell, there are three important points about the definition of CUs:

The major premise of the policy is that the genetic similarity within conservation units is greater than between them. Secondly, that the diversity within the conservation units provides a means to recolonize local spawning populations or demes that may become extirpated within a conservation unit. Thirdly, that the spatial size and spatial scale of conservation units are very different between species, largely reflecting the specific species’ genetic structure and their history.*

* On this third point, he noted that pink salmon are at one end of the spectrum, with little genetic diversity and only 13 CUs encompassing all their distribution in British Columbia, while lake-rearing sockeye salmon are at the opposite extreme, with more than 200 genetically discrete CUs. See Transcript, November 29, 2010, p. 11.

By capturing both the genetic diversity between populations and the connectedness between populations within certain geographic landscapes, the Conservation Unit concept is thought to provide “insurance” against habitat impacts. Ensuring a healthy CU is “by far the best sort of management plan to allow re-colonization of that habitat.”⁴¹

Dr. Riddell agreed that the populations within CUs are critical, especially for First Nations. He explained that, for this reason, the Wild Salmon Policy created the “joint obligation of management for production levels of abundance, and the distribution of fish amongst spawning streams.”*

In cross-examination, Dr. Riddell was asked about the degree to which small CUs truly contribute to overall abundance. He stated that there was a “continuous range” in which small CUs contributed, and that the lakes that support small populations are fundamentally small, with limited spawning areas. He added, however, “that the fundamental promise of the Wild Salmon Policy is that these small populations have other values, and this is the reason why they were sustained.”⁴²

Dr. Irvine explained that both the *Species at Risk Act* (SARA) and the WSP acknowledge the importance of diversity within the taxonomic species of sockeye salmon. He said, “[I]n developing the Wild Salmon Policy we attempted to align the conservation units as much as practicable with the minimum unit that could be listed under the *Species at Risk Act*.”⁴³

Biological status and strategic planning

Mr. Chamut acknowledged a tension between DFO’s Science Branch and Fisheries and Aquaculture Management in the development of the Wild Salmon Policy, and more generally on conservation issues.⁴⁴ A July 16, 2003, email from Paul Sprout, former regional director general, Pacific Region, to Dr. Laura Richards, regional director, Science, Pacific Region,

described the differences between Science and other branches in the region arising from “confusion around SARA and the Wild Salmon Policy and uncertainty over DFO direction relative to conservation and fisheries economic development.”⁴⁵ In June 2003, Mr. Chamut’s draft presentation to the minister stated, “[T]here is a need to agree on a process and roles for managing risks and reaching decisions on contentious issues related to co-migrating stronger and weaker stocks.”⁴⁶

By December 2004, DFO appeared to have resolved this debate internally, for the purpose of the Wild Salmon Policy, through three key developments, which I discuss in more detail below:

- a decision to adopt “benchmarks” for biological status, in Strategy 1, rather than conservation limits or reference points;
- the development of a strategic planning process in Strategy 4; and
- a decision to confirm that the minister has a limited discretion, constrained by process and transparency, to refuse to conserve a Conservation Unit in extraordinary circumstances.⁴⁷

Benchmarks rather than reference points

A “reference point” is a term used to describe a fisheries management objective in relation to the assessment of a particular stock (or CU). The terms “limit reference point” and “target reference point” are relevant to this discussion. Drawing on the Fishery Decision-Making Framework Incorporating the Precautionary Approach (Fishery Decision-Making Framework), Dr. Carrie Holt, a research scientist at Pacific Biological Station, described reference points as intersections between stock status and harvest removal rates.⁴⁸ Figure 1.10.2 illustrates the concept of reference points.

The Fishery Decision-Making Framework was created after the Wild Salmon Policy was finalized, but the illustration of reference points it contains is useful in understanding the debate around reference points which shaped the development of the policy. Reference points are determined in

* Transcript, December 1, 2010, pp. 108–9. See also Wild Salmon Policy (Exhibit 8, p. 16), which states: “Since the requirements and needs of First Nations and others may be at finer geographic scales than some CUs, management objectives to address these may be recognized in Strategy plans (Strategy 4).”

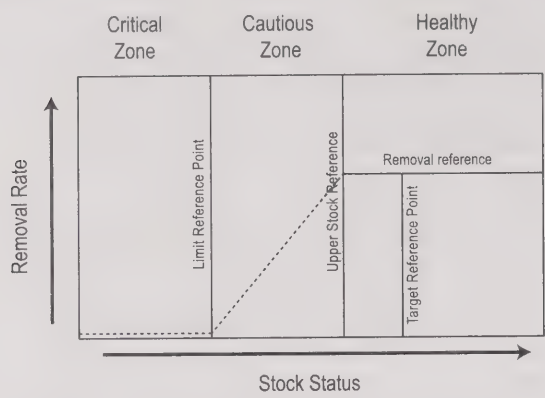


Figure 1.10.2 Reference points used in fisheries management

Source: Exhibit 185, p. 4.

relation to where fisheries management decisions will change. In contrast, benchmarks, as ultimately developed in the policy, are determined in relation to biological status only.⁴⁹

I discuss benchmarks and zones of biological status in more detail in relation to Strategy 1 later in this chapter. In short, the WSP contemplates each CU being assessed and located within one of three zones: green, amber, or red. Green represents the healthiest populations, moving through amber to red, which represents weak populations. The benchmarks are the intersections between the zones, with the upper benchmark describing the point between green and amber, and the lower benchmark describing the point between amber and red. Figure 1.10.3 illustrates how benchmarks relate to biological status.

Dr. Irvine explained that the Strategy 1 benchmarks, as conceived by the WSP development team, were intended to be based on two main types of information – abundance and distribution:

Now the types of information that were used, the two most important ones that we identified in the policy were the number of fish within a conservation unit, and their distribution. And so when you're thinking about the health of a group of fish, if you think of a watershed, you think about the fish in that watershed, if that was a conservation unit. You obviously want to have a certain number of animals. But you also want to have them distributed throughout that watershed. So you don't want to have all your eggs in one basket. So it's really talking about the abundance and their distribution. So those are the primary means by which to identify ... the lower benchmark and the upper benchmark.⁵⁰

The lower benchmark “was deliberately established at a point above or at a healthier stage than when a population or a CU or a designatable unit would be considered endangered under the *Species at Risk Act*.”⁵¹ Dr. Riddell concurred that the lower benchmark was designed to include a buffer above this conservation limit.⁵²

Dr. Irvine said the lower and upper benchmarks in Strategy 1 were not the same as limit and target reference points that direct salmon management decisions. Instead, reference points for management would be developed through integrated

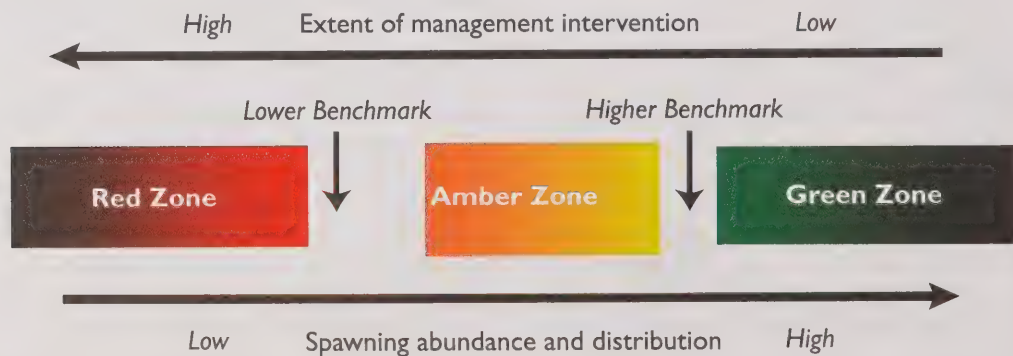


Figure 1.10.3 WSP benchmarks and biological status zones

Source: Exhibit 8, p. 17.

planning under Strategy 4.⁵³ He explained that, in developing Strategy 1 of the policy,

[DFO] used the term “benchmark” rather than “reference point” simply because reference points are often associated with societal values. And by using the term “benchmarks” in Strategy 1, we were not precluding the use of the terms “target reference points” and “limit reference points” in Strategy 4. But it’s important to understand that Strategy 1 is about the biological status of the resource and not ... necessarily to changes in fisheries management.⁵⁴

...

[A] target reference point is more of a fishery management objective. So where is it that you would like that population to be. And so for instance you may decide that your objective for a particular group of fish is to maximize economic opportunities from that fishery. You might decide that your objective is to maximize catch, which is quite different than the economic gains. Or you might decide that your objective is simply to prevent that group of fish from going extinct. So those are three very different targets. So what we tried to do in Strategy 1 is separate out the science from the management. And so the higher benchmark was attempted ... it would be at a point at which the population would achieve maximum yield. The lower benchmark was deliberately precautionary, so that it was set at a point above which COSEWIC [Committee on the Status of Endangered Wildlife in Canada] or *Species at Risk* would consider listing a population as endangered. So it’s just a biological status of a group of fish which would then feed into the decision-making process along with other information on the habitat that the fish lived in, their ecosystem, and of course social concerns and economic considerations.⁵⁵

Mr. Saunders said that, initially, DFO scientists wanted to set “hard and fast” conservation limits, before evolving to the use of benchmarks in the policy. DFO eventually decided that the Science Branch would identify benchmarks as “advice” rather than as a decision.⁵⁶ Mr. Chamut and Mr. Saunders said the debate about the use of benchmarks versus reference points was, at least in part, about whether to adopt a more prescriptive

precautionary approach to fisheries management, represented by reference points, or a more flexible approach, represented by benchmarks.⁵⁷

Dr. Riddell described the tension around the use of benchmarks rather than reference points as occurring between the Pacific Region and national headquarters. In describing the resolution, he focused on the innovation of adopting two benchmarks – including a lower benchmark for the first time in Pacific salmon management. He testified that “one of the big disagreements with Ottawa ... had to do with how the policy was integrating precaution. The point we had to get across is that the two benchmarks, instead of having just a single benchmark, was the really significant change in implementing precaution under the Wild Salmon Policy.”⁵⁸ Including a lower benchmark, he said, “was a major development of the policy. This is where the significant protection or conserving biodiversity would take place.”⁵⁹ The lower benchmark included a buffer to protect a CU from reaching a point of significant risk of extinction. The buffer was intended to provide space for food, social, and ceremonial harvesting and for environmental and management uncertainty and error, thereby incorporating a precautionary approach.⁶⁰ Dr. Riddell said that the Wild Salmon Policy’s use of a lower benchmark, rather than a limit reference point, was a way to ensure that stocks weren’t driven down to the level where they might not recover.⁶¹

The adoption of CU benchmarks rather than more prescriptive reference points was important in achieving internal consensus on the Wild Salmon Policy within DFO. Dr. Irvine gave evidence that “the debate about CU benchmarks versus reference points was difficult, and took more than a year to resolve internally in developing the WSP.”⁶² In his view, the policy’s use of the term “benchmarks” rather than “reference points” was deliberate and is important. The WSP terminology sought to make clear that no specific fishery, habitat, or cultivation management implications were associated with either lower or upper benchmarks. Identification of Strategy 1 benchmarks is intended to be a scientific exercise – to ensure that decision making and planning are informed by a biological assessment of CU status.⁶³

Likewise, Mr. Saunders described the difference between benchmarks and limit reference points as a subtle but important difference. He testified

that, “from a management perspective, there is no limit reference point” within the Wild Salmon Policy that directs if a CU hits a certain status point, such as the red zone, fishing will stop. Mr. Saunders acknowledged that the policy does prescribe action based on the Conservation Unit’s biological status, but he noted that “the only action that’s prescribed in the Wild Salmon Policy at that lower benchmark is to say that we will develop a plan to move us out of that Red Zone.”⁶⁴

A strategic planning process rather than operational guidelines

The second significant development, conceived by the WSP development team as a way to avoid operational guidelines or other prescriptive mechanisms in the policy, was an integrated strategic planning process. This process was intended to separate the assessment of biological status (Strategy 1) from the trade-offs that must be assessed in planning for conservation and sustainable use (Strategy 4).

Mr. Chamut said that a prescriptive policy with decision rules and explicit conservation targets would have been a mistake. Instead, the Wild Salmon Policy envisions that management every year will be guided by an integrated strategic plan, which, in his view, is a more robust and consultative process than the previous one in which DFO simply identified escapement targets.* Mr. Chamut felt that Strategy 4 was the most challenging and complex aspect of the policy for DFO, and also difficult for others to understand.⁶⁵

Fisheries management decision making is supposed to take place during the integrated planning process in Strategy 4. Stakeholders and First Nations can bring their perspectives to the attention of DFO and work with DFO to develop harvest strategies and recovery strategies through an integrated planning process. The process was conceived as a way to bring together information on the status, habitat, and ecosystems of the CUs (strategies 1, 2, and 3) to inform long-term planning by local communities, stakeholders and First Nations.⁶⁶

Allowing the minister to limit active measures in exceptional circumstances

A third development was intended to confirm the different roles used in resolving the tension between conservation and management flexibility.[†] The concluding language in Strategy 4, Action Step 4.2, confirms and informs the minister’s discretion in approving strategic plans:

The Minister of Fisheries and Oceans is accountable to Parliament for the conservation of fisheries resources. Accordingly, strategic plans for salmon conservation and sustainable use will be subject to final approval by the Minister of Fisheries and Oceans. The Minister may reject plans or elements of plans because they do not adequately conserve wild salmon. Alternatively, in exceptional circumstances, where recommended management actions are assessed to be ineffective, or the social and economic costs will be extreme, the Minister of Fisheries and Oceans may decide to limit the extent of active measures undertaken. The new planning process described above is expected to minimize the need for such decisions, but this possibility should be recognized. The rationale for such decisions will be clearly explained. In addition, any cumulative effect of these decisions will be closely monitored.⁶⁷

Mr. Chamut clarified the distinction between the Strategy 4 planning process and the decision-making responsibility, emphasizing that “the ultimate decision is inevitably made by the Minister.” He added that “if there is consensus within these regional watershed planning groups as to what to do in terms of a strategic long-term plan for management of a series of conservation units in a geographic area, if consensus is reached, I would think that that would be sufficient reason for the Minister to want to – very, very rarely, if ever – to intervene and reject that particular advice.”⁶⁸

* For a discussion of the current process for setting escapement targets, see Chapter 5, Sockeye fishery management.

† Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. As discussed further in Volume 3, Chapter 3, Legislative amendments, Bill C-38 contains a new section of the *Fisheries Act* which allows the minister of fisheries and oceans to enter into agreements, arrangements, or transactions with a variety of entities for the purposes of the Act. It also provides that cabinet can declare that certain provisions of the Act do not apply in a province. It is unclear how this provision will have an impact on the final approval of the minister of fisheries and oceans under Action Step 4.2.

He also described the process by which salmon management decisions would be made, and the criteria and considerations that would inform them:

[T]he obvious priority within the Wild Salmon Policy is conservation of genetic diversity of wild salmon. But there is a process by which decisions are made. They're not necessarily going to be based just on biological considerations, and there is a process by which social and economic considerations can be made when we're talking about plans to protect or rebuild or conserve a particular CU. But ... there's a continuum of concern. If you're dealing with a conservation unit that is at very low abundance and it's in that so-called red zone ... then the primary considerations that will be made about what to do with that CU will most often be biological. As you move up into greater degrees of abundance and ... less threats to the well-being of the conservation unit, then increasingly ... social and economic considerations will be an important part of whatever decision is taken. So there is this continuum. The intent of the policy that biological factors are going to be the primary considerations when the stock is at risk, with the one exception ... where it will make it extraordinarily difficult to be able to conserve a conservation unit, or if ... efforts to conserve it are going to fail or be excessively costly. That's then a matter that would be considered for a decision by the Minister after consultation in a full and open process that looked at the issue of the biological status, the costs and consequences of the decision.⁶⁹

Grand Chief Ken Malloway of the Stó:lō Tribal Council suggested in his evidence that there is still some controversy over this part of the policy. He described it as the "notwithstanding clause," his "number one concern with the Wild Salmon Policy."⁷⁰

Counsel for participants requested confirmation from DFO witnesses that a consultative process would take place before any such ministerial decision was made. Mr. Saunders thought there would be consultation but did not recall this provision being explicit in the policy itself.⁷¹ According to Mr. Chamut, the policy requires the minister's decision to be made openly and transparently, and, he

added, "[Y]ou can take from that that it will involve consultation and the minister will be making sure that it's not done with the stroke of a pen."⁷²

Consultation on the Wild Salmon Policy, 2004–5

The draft Wild Salmon Policy was released for public consultation on December 17, 2004.⁷³ Over the next six months, DFO made intensive efforts to consult with First Nations, stakeholders, and the public. DFO staff reviewed 246 written submissions in 2005, which they documented, responded to, and considered in making extensive revisions to the policy.⁷⁴

In 2005, DFO formed two large multi-interest dialogue forums, one for First Nations alone and the second for everyone, including First Nations, and held meetings to review the text of the draft policy in detail.⁷⁵ DFO held three multi-stakeholder sessions, and one for First Nations, in March and April 2005.⁷⁶ Following these sessions, DFO revised the draft policy and circulated it for further comment.⁷⁷

Mr. Saunders testified that the WSP "is one of the first policies that I believe was developed in such an open and transparent fashion." He said that "there was a high degree of understanding of this policy and engagement in its development with First Nations and stakeholders." He emphasized that the WSP development team carefully considered all input in revising subsequent drafts, made significant changes based on input after the stakeholder sessions, and provided a rationale when input was not adopted.⁷⁸

Through consultation, DFO heard the "pretty much universal" concern about inadequate resources for implementation as well as a "very strongly-held view by a number of individuals" that DFO lacked the will to implement the policy. Given these concerns, Mr. Chamut said he felt strongly that it was important to build the five-year performance review requirement into the policy (Strategy 6, Action Step 6.2).⁷⁹ He agreed that First Nations' and other groups' distrust of DFO's ability to implement the Wild Salmon Policy was alleviated by DFO's commitment to an independent review within five years. He testified that this Strategy 6 requirement was one of the final revisions "because it was probably one of the most strongly held views that came out of the very last forums that we had

just before finalizing the policy.” He described it as a “very late, but a very, very important component to the policy.”⁸⁰

DFO committed to prepare and release an implementation plan for the Wild Salmon Policy, which would define tasks and timelines, in the fall of 2005.⁸¹ Mr. Chamut said this additional plan was important “to try and give some confidence to people that there would be some immediate action that would be taken in order to make sure the policy was being implemented.”⁸²

Mr. Chamut told me about the relationship between available funding and the anticipated implementation timeline. He said there were adequate resources to implement the Wild Salmon Policy in a phased manner over roughly a five-year period. Although he thought it would be possible to implement the WSP within existing resources, in his view it might require making certain senior officials specifically responsible for WSP implementation.⁸³ Both Dr. Irvine and Mr. Saunders testified that at the time the policy was being developed, they thought it would take longer than five years to implement.⁸⁴

A May 16, 2005, briefing to Minister Regan identified some First Nations’ concerns about WSP implementation.⁸⁵ Mr. Saunders said that First Nations wanted confirmation that they would be involved in bottom-up, bilateral processes in their communities around Conservation Units and habitats.⁸⁶ He prepared a memorandum to the deputy minister, following the policy’s release, which stated that the release of the WSP was in large measure due to three factors: a successful consultation process that engaged First Nations and others, an agreement that First Nations would have a significant role in WSP implementation, and an understanding that the focus for the remainder of the calendar year would include “completion of a detailed implementation plan through consultation with FNs [First Nations] and other salmon interests.”⁸⁷

Mr. Chamut and Mr. Saunders both testified that, during development of the policy, First Nations were particularly concerned that there would be appropriate governance and decision-making structures for implementation, that the Wild Salmon Policy would honour the Crown’s obligations and not infringe rights, and that there would be adequate capacity for implementation.⁸⁸

Additional views of conservation and appropriate focus of management

Early in this Inquiry, Rob Morley, vice-president of the Canadian Fishing Company and a member of the Fraser River Panel (see Chapter 5, Sockeye fishery management), expressed an opinion on conservation that differed from the one articulated in the Wild Salmon Policy. In commenting on the definitions of conservation and sustainable use in the policy, Mr. Morley said that, although they were reasonable working definitions, in his view “conservation includes use as part of its definition” and that DFO’s approach in dividing conservation and sustainable use was “untenable.”⁸⁹

I am mindful, in this context, of the submissions of counsel for the West Coast Trollers Area G Association and the United Fishermen and Allied Workers’ Union, who urge me to recommend that the Wild Salmon Policy be eliminated and replaced with a simpler method of determining an appropriate level of harvest for the fishery while avoiding any unreasonable and genuine risk of extirpation.⁹⁰

Christopher Harvey, counsel for the West Coast Trollers Area G Association and the United Fishermen and Allied Workers’ Union, made forceful submissions to me to the effect that the purpose of the *Fisheries Act* and other federal statutes and treaties is to provide yield (harvest benefits), not conservation of the fish per se. These participants urged me to reject the suggestion that conservation, rather than the provision of sustainable yield for present and future generations, is the primary and overriding consideration for fisheries managers. The B.C. Wildlife Federation and the B.C. Federation of Drift Fishers generally agreed with these submissions. Mr. Harvey said: “The statutory mandate requires DFO to focus on yield and on conservation insofar as it is supportive of use. So conservation is a supportive goal rather than a goal in itself. It’s not the decline of genetic diversity that led to this Commission. It’s the decline of the fishery.”⁹¹

Findings

I do not agree that the *Fisheries Act* directs the Department of Fisheries and Oceans (DFO)

to subordinate conservation to the harvest of salmon.* One primary purpose of conservation is the long-term sustainability of the fishery, and, on the evidence before me, it is clear that sound conservation policies are necessary for a sustainable fishery. Moreover, the benefits of conservation are not limited to sustaining fisheries. I find that Canada's international commitments and the *Oceans Act* confirm the primacy of the federal government's conservation responsibilities. Indeed, the *Oceans Act* highlights conservation, based on an ecosystem approach, to be of "fundamental importance to maintaining biological diversity and productivity in the marine environment." The *Oceans Act* also states that "Canada promotes the wide application of the precautionary approach to the conservation, management and exploitation of marine resources in order to protect these resources and preserve the marine environment."⁹²

I find that the four priorities contained in the Wild Salmon Policy, which include conservation and sustainable use, are consistent with the approach set out in the relevant statutes and treaties informing the work of DFO and appropriate to the sustainability of the fishery. I agree with David Bevan, associate deputy minister, and Susan Farlinger, regional director general, Pacific Region, in their characterization of the Wild Salmon Policy as an expression of the precautionary approach in the context of Pacific salmon.⁹³

The findings and any related recommendations are discussed in Volume 3 of this Report.

■ Implementation of the Wild Salmon Policy

I heard evidence on the pace of implementation of the Wild Salmon Policy, the progress made in implementing it, and whether DFO developed an appropriate implementation plan for the policy.

Mr. Sprout, regional director general during the first five years of the policy, said that implementation was more complex than had been anticipated. In his view, DFO was naive and overly optimistic about how easily it could implement the various action steps. He said that a top-down approach to dictating Conservation Units or integrated management was not a sustainable concept today and that DFO requires time to reconcile the views of all the stakeholders.⁹⁴ Ms. Dansereau said that, given the state of knowledge at the beginning of implementation, neither the resources nor the timelines were realistic.⁹⁵

Ms. Farlinger identified the following issues as influencing the pace of WSP implementation: financial resources, the time needed to do the underlying technical work to identify CUs and their benchmarks, evolving science, data availability, and the impact of the policy on stakeholders.⁹⁶ She also noted:

I think the pace at which we've been able to bring people up to the same level of understanding, that is, collect the data and information, implement catch monitoring standards across the board to develop that trust I talked about earlier, they aren't happening with sufficient speed, either of them, to give people a kind of confidence they need to have to come together and ... provide the kind of integrated advice that they need to.⁹⁷

Dr. Richard Beamish, retired research scientist and head, Salmon Interactions Group, Pacific Biological Station, also noted: "Implementation of the policy requires a significant commitment to better monitoring and support for science. Under the conditions of reducing budgets, this is a major issue."⁹⁸

Dr. Riddell testified that WSP implementation seemed to have lost momentum in the last couple of years.⁹⁹ On strategies 1–3, he said that the slow pace of implementation may have resulted in large part from early technical challenges, in particular the need to define the Conservation Units under Strategy 1. Under Strategy 2, he said that habitat assessment methodological work had proceeded

* Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. As discussed further in Volume 3, Chapter 3, Legislative amendments, Bill C-38 amends the *Fisheries Act* to focus on the protection of fish that support commercial, recreational, or Aboriginal fisheries. As discussed above and in Volume 3, Chapter 3, the impact of this new focus on Fraser River sockeye is not known.

quickly in the first two years, but implementing habitat monitoring did not seem to be proceeding as quickly. Finally, he said Strategy 3 (inclusion of ecosystem values and monitoring) needed greater effort from DFO.¹⁰⁰

Implementation plan

The section of the Wild Salmon Policy called “Implementation: Making It All Work” anticipates and addresses some implementation challenges:

The adoption of a wild salmon policy is an important, long-awaited objective, but not an end in itself. Once it is adopted, attention must shift to implementation. The WSP requires acceptance of new ways of doing business and introduces a number of new program obligations. To ensure its commitments are met, an implementation plan will be prepared after the policy’s finalization. This plan will stipulate what tasks are required, how they will be performed, and when they will be completed. On completion, the plan will constitute the Department’s commitment to meeting its responsibilities for salmon conservation.¹⁰¹

The requirement for an implementation plan was added to the policy on the eve of its adoption, in the spring of 2005. DFO senior officials made many commitments, internally and externally, that the department would draft, consult on, and release a detailed implementation plan. In delivering a briefing to Minister Regan on the draft policy on May 16, 2005, Larry Murray, then deputy minister, and Mr. Chamut advised of the new “commitment to preparation and release of [a] plan for implementation.” They further advised the minister that this implementation plan would include tasks and timelines and would be released that fall.¹⁰²

Mr. Sprout characterized three documents, produced in August and September 2005,¹⁰³ as collectively meeting DFO’s obligation to create a WSP implementation plan: “[T]hat collection of the strategic work plan, the work plans themselves, [and] the results-based accountability management framework is the Implementation Plan.”¹⁰⁴ He emphasized that these three

documents contained the necessary elements of any implementation plan: objectives, tasks, actions, deliverables, deadlines, responsibilities, and a budget.¹⁰⁵

The third of these documents was dated September 20, 2005, and entitled “Wild Salmon Policy Implementation Workplan – Results-based Management and Accountability Framework – Draft” (Draft RMAF).¹⁰⁶ The Draft RMAF set out a number of deliverables, with completion dates, all related to the task “Development of WSP Implementation Plan”:

- On September 13, 2005, a meeting of the WSP Implementation Team “to review Workplan and discuss Implementation Plan.”
- In early October 2005, “Draft Implementation Plan.”
- In late October 2005, “Meeting of WSP FN [First Nations] and Multi-interest Fora to review draft Implementation Plan.”
- In late November 2005, “WSP Implementation Plan.”¹⁰⁷

The Draft RMAF differentiates between a work plan and an implementation plan. Mr. Sprout acknowledged that annual staff work plans were meant to guide DFO’s actions toward meeting the implementation plan.¹⁰⁸

The Draft RMAF anticipates that DFO would consult First Nations and others on a draft implementation plan.¹⁰⁹ On December 7–8, 2005, DFO held a First Nations forum and a multi-stakeholder forum. Although DFO staff discussed implementation planning generally with attendees, there is no evidence in the meeting minutes or the summary report that DFO disclosed any document that was a draft of an implementation plan.¹¹⁰

Members of DFO’s Wild Salmon Policy Implementation Team noted that, in addition to these forums, there were other meetings with First Nations and stakeholders on WSP implementation.¹¹¹ However, none of the numerous exhibits describing DFO’s various WSP meetings held between 2006 and 2010 mentions consultation on any document described as a draft implementation plan.

When asked about the commitment by Mr. Sprout in April 2005 to consult First Nations on an implementation plan, Mr. Saunders acknowledged that no implementation plan exists:

I don't have a clear recollection of ever landing on a finalized document that would have had the plan. It was more of a continuous engagement and notification of the sort of work that was ongoing ... and results, and then another round of what we would be doing in subsequent years. So I don't recall a specific long-term ... if you're asking for ... a five-year plan, I don't recall anything like that.¹¹²

Ms. Farlinger was asked whether there has ever been a WSP implementation plan. She suggested that, while there used to be an implementation plan, it was no longer in effect; instead, there was a "current timetable" for WSP implementation. I received no other evidence about the "current timetable" to which Ms. Farlinger alluded, unless she was referring to the 2011–12 draft internal staff work plan.¹¹³

Ms. Farlinger could not provide any indication of what WSP tasks would be implemented within the next two or five years.¹¹⁴ She pointed to two types of documents setting out expectations: the annual staff work plans and the Marine Stewardship Council (MSC) Action Plan.* Beyond these plans, she said she would have to speculate about anticipated timelines for WSP implementation.¹¹⁵

I also heard evidence that no comprehensive costing exercise was performed by DFO in anticipation of the implementation of the Wild Salmon Policy. In April 2002, the National Policy Committee considered the Pacific Region's proposal for such a policy and directed that DFO staff "develop a cost strategy, including science needs, for the WSP."¹¹⁶

In 2008, Rebecca Reid, regional director, OHEB, assisted by Heather Stalberg, a senior DFO biologist, did make efforts to advocate for WSP funding for the branch. They met with Ian Matheson, national director general of the Habitat Management Program, and made a detailed pitch for the continuation of funding to implement DFO's obligations under Strategy 2.¹¹⁷ However, it appears that their request was not accepted at the national level.

Mr. Sprout was not aware that the region ever assessed the costs of fully implementing the policy. He

was unaware of the costing work by Ms. Stalberg and Ms. Reid in relation to Strategy 2. He had not submitted any cost estimate or proposal on WSP implementation to national headquarters before the policy was approved, except for the proposal developed by the regional director of policy in 2005, and that proposal secured the region some initial incremental funds for full implementation of the WSP.¹¹⁸

Ms. Farlinger testified that DFO did an annual WSP costing exercise for planning purposes; however, she agreed that full implementation costs had not been estimated. She said the costing focus is on what is required to fund the next step in implementation and, because "the work is evolving as we're going along," it is not possible to budget for WSP implementation.¹¹⁹

The need for a WSP implementation plan, setting out how and by when DFO will implement the policy, became increasingly evident to me during the final witness panel. At that time, the deputy minister, the associate deputy minister, and the regional director general all presented me with their interpretation of what is meant by the "implementation" of the Wild Salmon Policy. In essence, these witnesses suggested that WSP implementation is largely achieved through DFO considering the intent, spirit, and principles underlying the policy when making regulatory decisions and recommendations to the minister.

Ms. Dansereau was asked if DFO was fully committed to implementing the policy. She said that the WSP was an essential policy and a priority policy on the West Coast. However, she also clarified that DFO was committed to implementing the policy's "intent":

Yes, absolutely, to the intent of the Wild Salmon Policy and whether or not we are able to meet some of the deadlines in there, I don't know because some of them were developed in the absence of science, and we are working at trying to get the answers to be able to set realistic timelines, but yes ... it is our guiding document for the management of Fraser sockeye, and that would not be so if it weren't a priority.¹²⁰

* DFO created this longer-term action plan to support MSC certification, including elements of WSP implementation. I discuss DFO's MSC Action Plan, and how it indicates the feasibility and desirability of a longer-term WSP implementation plan, later in this chapter in the section on the intersection between WSP implementation and MSC certification of the Fraser River sockeye fishery.

When asked if DFO has ever assessed what it will cost to implement the policy, Ms. Dansereau said:

[I]’m having trouble with the word, “implement,” in the context that it’s being used here. The Wild Salmon Policy ... guides decision making to the most senior level inside the Department and even though all of the subparts of the Policy haven’t reached their full fruition ... that doesn’t mean it’s not being implemented. We don’t have everything done as we said we would in here, but the guiding principles are the guiding principles by which we make decisions.¹²¹

Ms. Dansereau further explained what she meant by “implementation”:

[W]hat I meant was if I look at the principles, which, to me, a policy should be much more about principles than it should be about specific targets and timelines for implementation because if I was writing this today, I would separate some of the parts of this out and call those one[s] policies, and I would call some of the other pieces that are more specific, with targets and timelines, I would call those a program, and they would be treated quite differently. But the guiding principles, conservation, honouring obligations to First Nations, open process, sustainable use, those are principles that guide our decision making today.¹²²

Ms. Farlinger suggested that WSP implementation equates to making decisions that reflect the spirit of the policy. She set out the types of DFO regulatory activities that she believed had reflected the policy’s intent, concluding:

So I think there are a broad suite of ways in which the Policy is being implemented. If you look at the strategies set out on page 17 of the Policy, are every one of those done? No, they are not, but the [effect of] regulation and the decisions that are made, and the Science priorities and the work we have done in habitat and integrating ecosystem into decisions all take us in the direction of the intent of the Policy. So that’s really the only way I could describe how it’s being implemented.¹²³

She also stated that the policy was implemented through DFO’s harvest management decisions. She said that every one of strategies 1 through 6 was very ambitious, and information gathered under the strategies would inform the annual fishing plan under Strategy 5. In this respect, DFO was said to be “operating consistently with the policy.”¹²⁴ Similarly, Mr. Bevan said that DFO had implemented the policy through DFO’s move to weak stock management.¹²⁵

In contrast to the evidence of these DFO witnesses, Jeffery Young of the David Suzuki Foundation replied in the negative when asked if DFO is managing the fishery in a manner consistent with the policy’s objectives:

To answer the question plainly, no, I don’t think they are. I think there are efforts to conserve certain stocks at certain times using some sort of effort, whether that’s timing or area closures, those types of things. This is largely, I’d say, consistent with approaches that they’ve taken in the past. But in terms of actually understanding the CUs that are caught in a fishery, what their status is relative to a benchmark, and explicitly managing the fishery to be consistent with recovery plans for CUs below their benchmark, no, that’s not happening.¹²⁶

I agree that DFO’s work in relation to Pacific salmon should be informed by the spirit and intent of the Wild Salmon Policy. However, implementation of the policy must go further.

Notwithstanding the evidence that the Wild Salmon Policy has not been fully implemented, a number of steps have progressed since the policy was announced in 2005.

Strategy 1: Standardized monitoring of wild salmon status

Strategy 1 requires a systematic organization of all Pacific salmon into geographically, ecologically, or genetically distinct populations termed Conservation Units that allow for monitoring of abundance and distribution of salmon within those units over time.¹²⁷ Other strategies are based on the definitions and indicators from Strategy 1. Implementation of Strategy 1 is therefore crucial to the success of the WSP.¹²⁸

Strategy 1 includes three action steps. Action Step 1.1 is to identify CUs. Action Step 1.2 is to develop criteria to assess CUs and identify benchmarks to represent biological status. Action Step 1.3 is to assess and monitor the status of CUs.

Dr. Irvine identified the key DFO staff working on Strategy 1. For the identification of Conservation Units under Action Step 1.1, the key staff member was Dr. Blair Holtby of DFO Science, assisted by Dr. Kristy Ciruna of Nature Conservancy Canada. For the creation of the CU benchmark methodology under Action Step 1.2, the key staff member was Dr. Carrie Holt, a research scientist with the Pacific Biological Station, working with Dr. Holtby, Dr. Riddell, and Al Cass, head of the Centre for Science Advice, DFO Science, Pacific Region, and former chair of the Pacific Scientific Advice Review Committee.¹²⁹ Dr. Holt told me that, in December 2010, a Strategy 1 Oversight Group was created to bring together scientists, managers, and stock assessment staff, to give updates and to assist with developing tools for benchmark selection and status assessments.¹³⁰

By 2008, DFO had identified CUs for all salmon in British Columbia.¹³¹ A paper written by Dr. Holtby and Dr. Ciruna established a methodology for the identification of CUs and suggested a provisional list of all BC salmon CUs. This paper was published by the Centre for Science Advice, Pacific (CSAP), in 2008.¹³² Completion took longer than expected largely because the number of CUs identified was greater than anticipated. Dr. Holtby and Dr. Ciruna identified 420 salmon CUs, including 238 sockeye CUs, of which 31 were Fraser River lake-type CUs and seven were Fraser River river-type CUs.¹³³ The number of CUs is expected to fluctuate over time as new information reveals that CUs should be amalgamated or split.¹³⁴ The paper described various metrics to assess spawner abundance, trends in abundance, and productivity.¹³⁵ Dr. Holt testified that “our hope is to provide assessments on all four or five of these metrics and assumptions, provide information for all, so you can get the whole story and then provide that so that managers can then decide how they want to prioritize among those [CUs].”¹³⁶

As new information became available, Dr. Holtby and Dr. Ciruna revised the list of Fraser River sockeye salmon CUs.¹³⁷ The WSP provides that changes to the list of CUs will be made through the CSAP (formerly the Pacific Scientific

Advice Review Committee [PSARC]) peer-review process. A 2010 draft paper written by DFO’s Sue Grant and others identifies 26 assessable CUs, 10 tentative CUs for which additional research is required, and five CUs to be removed from the original CU list (Grant Draft 2010).¹³⁸ The request for scientific advice that led to this draft paper notes that DFO Stock Assessment flagged several of the CUs as attributable to opportunistic spawning sites only rather than to persistent populations.¹³⁹ Dr. Holt testified that, of the five populations proposed for removal from the list of Fraser River CUs, two populations were incorrectly identified as CUs based on clear mistakes, while three other populations are uncertain.¹⁴⁰

Canada submitted that the preliminary WSP status assessment by Ms. Grant and her co-authors “should not be relied on to inform management actions in the interim because the assessments of status that it contains may change during the ongoing peer review process.”¹⁴¹ In September 2011, Dr. Richards, confirmed that the August 25, 2011, revision of Grant Draft 2010 was the authors’ “close to final” draft (Grant Draft 2011).¹⁴² She testified that this draft provides, in “exhaustive detail,” information on the biological status of individual Fraser River sockeye CUs according to WSP status zones, although it notes “some uncertainty about what the status is.” While Grant Draft 2011 might not answer every question about the status of Fraser River sockeye CUs, Dr. Richards said that science operates in this incremental way and that DFO can always do further work in the future.¹⁴³ She testified that, between the earlier version (Grant Draft 2010) and the later Grant Draft 2011, “the content of the paper has not really changed substantively. There are some differences in the paper in terms of the way the figures were portrayed, but fundamentally, the same results are being given in both versions of the paper.”¹⁴⁴

In Grant Draft 2011, the status of each stock is presented across a range of benchmarks, and no final status summary is presented. Using trends in abundance, Grant Draft 2011 states that 15 CUs are in the red zone in terms of recent abundance trends, while four CUs are in the red zone when looking at the long-term trend.¹⁴⁵ While Grant Draft 2010 states that seven Fraser River sockeye CUs are consistently poor in status – in the red zone (Takla-Trembleur-ES, Bowron-ES, Nathatlatch-ES, Taseko-ES, Cultus-L, Widgeon [river-type], and Kamloops-L),

Table 1.10.1 List of Fraser River sockeye CUs as set out in Grant Draft 2011

Current	<i>De Novo</i> (new)	Validation Required	Extirpated	Removed (no longer CUs)
1 Anderson-Seton-ES	1 North Barriere-ES ²	1 Cariboo-S(extirpated?)	1 Adams-ES	1 Boundary Bay
2 Bowron-ES	2 Seton-L	2 Francois (First Run)-ES (extirpated?)	2 Alouette-ES	2 Carpenter Lake
3 Chilko-ES ^a		3 Francois (Second Run) - ES (extirpated?)	3 Coquitlam-ES	3 Fraser Canyon
4 Chilko-S ^a		4 Indian/Kruger-ES (extirpated?)	4 Fraser-ES	4 Haywood Lake
5 Chilliwack-ES		5 Middle Fraser (River-Type)	5 Kawkawa-L	5 Thompson (River-Type)
6 Cultus-L		6 Upper Fraser (River-Type)	6 Momich - ES	6 Stuart-Early Stuart
7 François-Fraser-S			7 North Barriere-ES ²	
8 Harrison (D/S)-L			8 Seton-S	
9 Harrison (U/S)-L				
10 Harrison River (River-Type)				
11 Kamloops-ES ^b				
12 Lillooet-Harrison-L				
13 Nadina-François-ES (new-mixed CU)				
14 Nahatlach-ES				
15 Pitt-ES				
16 Quesnel-S				
17 Shuswap-ES				
18 Shuswap Complex-L				
19 Takla-Trembleur-ES _{tu}				
20 Takla-Trembleur-Stuart-S				
21 Taseko-ES				
22 Widgeon (River-Type)				

CU, Conservation Unit; D/S, downstream; U/S, upstream; S, Summer; ES, Early Summer; L, Late; ES_{tu}, Early Stuart

^a Kamloops-ES does not include extirpated populations upstream of the previous dam on Barriere River, which are now part of the North Barriere-ES (extirpated) CU; hatchery transplants in the North Barriere system, after dam removal, have produced new growing populations, now identified as the North Barriere-ES (*De Novo*) CU.

^b Chilko-ES and Chilko-S are aggregated for CU assessment purposes; these data sets cannot be disaggregated.

Source: Reproduced from Exhibit 1915, p. 2.

Grant Draft 2011 states that only three Fraser River sockeye CUs were determined to be in the red zone across all abundance metrics (Bowron-ES, Taseko-ES, and Cultus-L).*

The list of Fraser River sockeye Conservation Units given in Grant Draft 2011 is set out in Table 1.10.1.

In relation to Action Step 1.2, DFO has completed work in 2009 to develop a method for establishing benchmarks. However, the method has not been adopted and no benchmarks have been established for any Fraser River sockeye CU.¹⁴⁶ A paper by Holt and others published following CSAP review identifies four classes of indicators: abundance, trends in abundance, distribution, and fishing mortality relative to productivity and distribution. It proposes that these four criteria better capture population status

than abundances alone.¹⁴⁷ The paper identifies quantifiable metrics and candidate benchmarks for the abundance and fishing mortality indicators. The two candidate benchmarks are evaluated using a simulation model.¹⁴⁸ Distribution metrics were not included because the historical monitoring data were not extensive and consistent enough to allow the authors to understand if populations had been expanding, contracting, or changing their distribution within a Conservation Unit.¹⁴⁹

Where and how CU status benchmarks are set can have significance to First Nations in a number of ways. If CU status indicators are limited to abundance and exclude distribution, then a Conservation Unit with rapidly shrinking distribution may be deemed healthy, but a First Nation may lose the ability to fish it locally. First Nations have repeatedly emphasized to DFO that CUs must be assessed in terms not only

* Each CU is identified by run-timing group: ES_{tu} - Early Stuart; ES - Early Summer; S - Summer; L - Late.

of abundance but also of distribution, to ensure that individual communities have access to fish.¹⁵⁰

Marcel Shepert, coordinator of the Upper Fraser Fisheries Conservation Alliance (UFFCA) and also a member of the Fraser River Panel and a participant in the Integrated Harvest Planning Committee (IHPC), testified that there had been no engagement by DFO with Upper Fraser River First Nations or their technical staff on DFO's development of CU benchmarks. Although the WSP states that the determination of lower benchmarks requires consultation with First Nations and others affected by this choice, Mr. Shepert stated that benchmark development under Strategy 1 lacked the meaningful input that First Nations had sought during the policy's development.¹⁵¹

As of the December 2010 hearings, DFO had not determined how to combine information across metrics – where one CU was assessed in the green zone for one criterion and the red zone for another. In December 2010, Dr. Holt said that DFO Science had not decided what the final approach would be but expected it to be a topic for a Canadian Science Advisory Secretariat (CSAS) paper in 2011.¹⁵²

Benchmarks are likely to change every year as new information becomes available.¹⁵³ Both Grant Draft 2010 and Grant Draft 2011 apply the methodology developed by Holt and others to Fraser River sockeye.¹⁵⁴ They describe upper and lower benchmarks for 18 Fraser River sockeye CUs as examples of the methodology for establishing benchmarks.¹⁵⁵ Dr. Holt testified that technical challenges, especially delimiting CU-specific data from data historically collected on aggregate stocks, have delayed implementation of Action Step 1.2.¹⁵⁶

Action Step 1.2 also provides that, within the red zone, there will be a level of abundance that cannot sustain further mortalities due to fishing or habitat change. This level remains to be determined. Dr. Holtby is developing a rapid assessment methodology.¹⁵⁷ This work, which remains in draft, may be “in line with” the WSP requirement to determine a minimum abundance level.¹⁵⁸

As discussed above, during development of the policy, there was a debate within DFO over whether to use reference points, a common tool in fisheries management, or a different metric based on

biological considerations. The issue came up during the hearings in relation to the implementation of the Wild Salmon Policy and with respect to MSC certification – a topic discussed below. As such, there is some value in revisiting the policy and the evidence on what was intended in Action Step 1.2.

The WSP states, “Benchmarks identify when the biological production status of a CU has changed significantly, but do not prescribe specific restrictions.”¹⁵⁹ This statement was explained by Dr. Irvine:

[W]ithin the Wild Salmon Policy Strategy 1, we're dealing with biological benchmarks, which relate to the biological status of the resource. Limit reference points and target reference points invoke other types of information, additional types of information, and they are appropriate management targets and limits, but Strategy 1 is dealing with the biological status of the resource ... [A]nd essentially, when you think of the status of a population, it's like a line with an infinite number of points along it. The lower benchmark and the upper benchmark are specific points along that biological status line.¹⁶⁰

The benchmarks are intended to be established, on a case-by-case basis, as follows:

The lower benchmark between Amber and Red will be established at a level of abundance high enough to ensure there is a substantial buffer between it and any level of abundance that could lead to a CU being considered at risk of extinction by COSEWIC.

...

The higher benchmark between Green and Amber will be established to identify whether harvests are greater or less than the level expected to provide, on an average annual basis, the maximum annual catch for a CU, given existing environmental conditions.¹⁶¹

The number of spawners necessary to provide the maximum sustainable yield (MSY) is considered in relation to both the upper and lower benchmarks, but MSY is only one of a number of considerations when establishing the benchmarks.*

* Exhibit 8, p. 18. “Maximum sustained yield,” as used in the policy, is equivalent to “maximum sustainable yield.” For further discussion of this concept, see Chapter 5, Sockeye fishery management.

As explained in the policy, biological considerations are the primary drivers for management of CUs in the red zone; broader considerations of biological, social, and economic issues come into the management of CUs in the amber zone; and social and economic considerations are the primary drivers for management of CUs in the green zone.¹⁶²

In the hearings, I found some confusion between the evidence of Ms. Farlinger and Mr. Bevan, on the one hand, and that of the scientists involved in implementing Strategy 1, on the other, in relation to whether benchmarks are equivalent to reference points. The evidence of the scientists involved in developing the policy, including Dr. Irvine and Dr. Riddell, was that benchmarks were different from reference points. In evidence relating to implementation of the policy, however, this distinction between reference points and the policy's treatment of benchmarks was not apparent. Both Ms. Farlinger and Mr. Bevan asserted that the policy incorporates Canada's international law commitments to implement the precautionary approach. Ms. Farlinger expressly compared the policy to the Fishery Decision-Making Framework Incorporating the Precautionary Approach, which adopts reference points for management.¹⁶³ In explaining why this Fishery Decision-Making Framework was conceptually "very closely aligned with the Wild Salmon Policy," she emphasized its use of reference points:

[T]here is a point below which there will be no fishing ... there is an area between that point and a point of healthy fisheries in which fisheries will be restricted in order to support rebuilding of the stocks. And then over that healthy stock size, there is a point where fishing will be able to go on in a less constrained manner, not completely unconstrained, but less constrained.¹⁶⁴

Mr. Bevan referred to the precautionary approach and the role of the Wild Salmon Policy in implementing it for Pacific salmon. Asked about the need to incorporate CU benchmarks into management, he answered that incorporating Fraser River sockeye CUs and their "limit references" was the basic element of the precautionary approach.¹⁶⁵ He also agreed that limit reference points are intended to constrain harvesting through

decision rules. However, under cross-examination, he distinguished the precautionary approach in international fisheries law as a poor fit for Pacific salmon, noting that it was designed for "normal marine fish populations and doesn't necessarily fit as well in its design concept to an anadromous fish stock." In particular, he distinguished the concept of maximum sustainable yield in the *UN Fish Stocks Agreement* as inapplicable to, and "risky" for, Pacific salmon. He added that, in applying the precautionary approach to Pacific salmon, DFO must consider not only risks to salmon productivity but risks posed to the ecosystem too.¹⁶⁶

Dr. Holt testified that the policy incorporates the precautionary approach in directing that DFO should not rely on uncertainty in the data or in scientific knowledge to delay action. In particular, the WSP accounts for uncertainty by allowing for a substantial buffer between the lower benchmark and a level that would be considered at risk by COSEWIC. However, she also said that the policy's use of benchmarks does not equate to the use of reference points for harvest management, as required by DFO's national Fishery Decision-Making Framework.¹⁶⁷

The Fishery Decision-Making Framework, Dr. Holt explained, requires the delimitation of reference points and mandates a direct relationship between a low stock status and harvest removal rates. In contrast, the WSP Strategy 1 biological benchmarks "are not directly linked to a removal rate." Rather, where a CU is in the red zone, the policy will "trigger immediate consideration into possible management actions to reduce probabilities of extinction, but doesn't specify a specific removal rate."¹⁶⁸ In her view, "[I]f a CU falls below a lower benchmark under the WSP, this is meant to trigger management concerns to identify what the response should be but is not intended to dictate a specific action or outcome."¹⁶⁹

Action Step 1.3, which requires assessment and ongoing monitoring of the status of CUs, has not yet begun in earnest. However, Dr. Irvine stressed that DFO has been monitoring the status of Fraser River sockeye CUs for more than 50 years through its regular stock assessment activities.¹⁷⁰

Timber Whitehouse, area chief of the Fraser River Salmon Stock Assessment Program, who is responsible for the enumeration of Fraser River sockeye spawning escapements, stated that "the

way we enumerate fish has always addressed CU requirements. The resolution to which we count goes well below the CU level ... There's about 340 distinct spawning sites."¹⁷¹ He said that stock assessment activities have always been well aligned with the WSP and support its delivery: "The way the sockeye are counted allows you to roll the escapement data up to the level of CU."¹⁷²

Dr. Riddell noted that DFO will require adequate in-season assessments to ensure that CUs are managed to meet the lower benchmarks and that major recovery efforts are not necessary.¹⁷³ The WSP envisions a formalized monitoring plan that features CU-specific monitoring, both intensive and extensive, with reference to the upper and lower benchmarks and three status zones.¹⁷⁴ Currently, DFO does not have such a plan.¹⁷⁵

During the December 2010 hearings, Dr. Holtby was developing a CU stock assessment framework. I heard that the development of this framework is one of the key elements required to proceed with Action Step 1.3 because it would both describe the assessment approach and help prioritize where work is most urgently needed.¹⁷⁶

Findings

I have considered the evidence I heard and reviewed the text of the policy itself. I am satisfied that the Wild Salmon Policy (WSP) is intended to establish lower benchmarks that are different from limit reference points, as that term has been described by Dr. Jim Irvine; Susan Farlinger, regional director, Pacific Region; and David Bevan, associate deputy minister. Although the lower benchmark requires management action, it does not prescribe the management action to be followed. According to the WSP, the management action to address Conservation Units below the lower benchmark in the red zone is to be developed under Strategy 4.

Strategy 2: Assessment of habitat status

Strategy 2 is intended to identify the habitats necessary for the conservation of wild salmon and to assess changes in their status over time, thereby complementing DFO regulatory and compliance programs and improving the department's capacity

to monitor and protect habitat proactively. Once indicators on a watershed scale are selected to assess the quantity and quality of habitats, benchmarks are to be developed to reflect the desired values of each key indicator (see Chapter 6, Habitat management, for details of these compliance and monitoring programs).¹⁷⁷

Michael Crowe, section head, Habitat Management Program, OHEB, BC Interior, described the key components of fish habitat:

We consider riparian areas part, a critical part of the habitat. They are actually a component of the habitat in that they contribute shade, which moderates temperatures, there is leaf litter and other nutrient drops that the fish depend upon. The trees that fall become cover and change channel structures, provide direct cover, as well as maintaining the channel shape, sediment quality, controlled groundwater ... so essentially we manage riparian areas as a critical component of fish habitat.

...

There would be water quality parameters, that would be part of fish habitat. But essentially, the life cycle of the fish, the fish are dependent on different habitat units throughout their life cycle, so part of that would be the freshwater stream component, the freshwater lake component, both the in-shore transitional period when ... they first emerge but there's a habitat requirement for the deep water portions of lakes, as well. Then there's the migratory habitat which is essentially where they need to transfer to the marine environment, as well as migrate back up as adults; therefore, we're interested and ... we're protecting those critical migratory routes, the estuary piece, as they are transitioning to the marine environment, as well as the marine habitat. But for the streams and lake-shores, we consider the riparian areas to be an integral part of that habitat.¹⁷⁸

Strategy 2 includes four action steps. Action Step 2.1 provides for the documentation of habitat characteristics. Action Step 2.2 provides for selection of habitat indicators and development of benchmarks for habitat assessment. Action Step 2.3 addresses monitoring and assessing habitat status. Action Step 2.4 provides for the establishment of

linkages to develop an integrated data system for watershed management.¹⁷⁹

The ongoing implementation of Strategy 2 has been led by OHEB.¹⁸⁰ From November 2005 to March 2009, OHEB maintained the WSP Habitat Working Group (HWG), which was responsible for developing and implementing an approach to Strategy 2 and included staff from Science and OHEB.¹⁸¹ The HWG was chaired by Ms. Stalberg, who was the dedicated full-time Strategy 2 coordinator from July 2006 to January 2009, when the position was terminated.¹⁸² Ms. Stalberg described the membership of the HWG as having representatives from multiple levels of management with expertise in multiple disciplines within the department and OHEB.¹⁸³ Since early 2009, OHEB has made limited contributions to implementing the WSP. As of 2010, an OHEB representative again sat on the WSP Implementation Team; Melody Farrell, a habitat management official with regional headquarters, is responsible for implementing Strategy 2.¹⁸⁴

As regional director from 2007 to 2010, Ms. Reid oversaw OHEB's contribution to WSP implementation and received direct reports from Ms. Stalberg on Strategy 2. Ms. Reid testified that, although the intention is to implement Strategy 2 completely, in the absence of new funding, it is being done in an incremental way. With respect to the Fraser River watershed, she said that a complete costing analysis for Strategy 2 implementation had not been done, but that implementation would require millions of dollars.¹⁸⁵ In contrast to FAM, which has particular employees assigned to tasks in DFO's internal annual work plans, the 2011–12 draft WSP work plan does not identify any particular OHEB staff accountable for implementing Strategy 2.¹⁸⁶

In Chapter 6, Habitat management, I review in detail the current policies and work of the Habitat Management Program in relation to Fraser River sockeye. The work of this program is largely focused on assessment of individual projects. Although the program has tools and objectives that would complement WSP and assist in implementing it, such as the 1986 Habitat Policy (including habitat inventory assessments and habitat restoration and development goals), as well as effectiveness and fish

habitat health monitoring, none of them have been pursued with the rigour required to make meaningful contributions to implementation of the WSP or the 1986 Habitat Policy.

In testifying about OHEB's progress in implementing Strategy 2, many DFO witnesses identified challenges, which included a “disconnect” between WSP and the Habitat Management Program. In a 2008 presentation to the national director general of the Habitat Management Program, Ms. Stalberg attributed the problem to the fact that the Habitat Management Program's mandate does not include Strategy 2 work, and, further, that OHEB does not have the necessary funding or staff to carry out the work.¹⁸⁷

Ms. Reid, in addressing the result of this presentation, said that, nationally, the view was that OHEB had failed to make a strong case to situate the WSP within the Habitat Management Program but that, operationally, OHEB continued to do Strategy 2 work. She described the disconnect as one of scale: the WSP habitat indicator work is at an ecosystem scale, while the work of the habitat practitioners is project by project.¹⁸⁸ I note, however, that the work of DFO's Habitat Management Program is broader than project-specific review.* During the hearings on habitat management, DFO witnesses, including Ms. Reid, pointed to WSP habitat indicators as important in measuring whether the No Net Loss objective of the 1986 Habitat Policy is being met.¹⁸⁹

In his testimony, Mr. Saunders described the “struggle” to make the national Habitat Management Program recognize the WSP as a component of, and compatible with, that overall program.¹⁹⁰ Ms. Reid spoke of the internal debate about whether OHEB ought to be doing Strategy 2. However, she said it is simply a matter of resourcing the activity and, once the department agrees it is important (specifically habitat status indicator work) and commits the necessary funding, decisions will be made about who actually does the work.¹⁹¹ She said that an assessment of what is required to fully implement Strategy 2 is required.¹⁹²

Mr. Sprout stated that an increase in resources to OHEB would be “very helpful” to better implement the WSP. He said that OHEB finds it difficult to

* Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. As discussed further in Volume 3, Chapter 3, Legislative amendments, Bill C-38 amends the habitat protection provisions in a way that may have an impact on DFO's use of an ecosystem approach.

cope with the workload it already has, and to assign staff to WSP Strategy 2 work is particularly challenging.¹⁹³ In September 2011, Ms. Farlinger said that a review and renewal of the Habitat Management Program to address the overall workload and resource challenges was under way and that they would address issues that are preventing the full implementation of the WSP.¹⁹⁴

Ms. Stalberg described the two-tier approach the HWG developed for delivering Action Step 2.1. First, an overview report is prepared for each Conservation Unit. Second, where an overview report has identified issues that require further examination within a priority CU, a habitat status report is prepared.¹⁹⁵ She described the overview report as a “brief overview of the watersheds within a CU where the population of fish would exist, the general threats to the population within a CU, or habitat-related threats.”¹⁹⁶ She explained that the habitat status report goes into much more detail, including the population of fish, life history requirements for each life stage, limiting factors, and highly productive habitats for each life stage, as well as monitoring, conservation efforts done to date, and any recommendations. Ms. Stalberg explained that multiple sources are used to prepare a habitat status report, including both published and unpublished literature, local ecological knowledge, and Aboriginal technical knowledge.¹⁹⁷

In 2005–6, DFO piloted both overview and habitat status reports to test the format and the structure of the reports.¹⁹⁸ However, Mr. Saunders explained that DFO has not implemented the reports operationally.¹⁹⁹

Mr. Saunders and Paul Ryall, former lead, Salmon Team, DFO, could not confirm whether any habitat status reports had been completed within the Fraser River watershed.²⁰⁰ DFO witnesses said this result was due to funding and workload issues. Ms. Reid noted that considerable time and investment were required to develop the methodology for the work and, once that was done, the amount of funding available to do the actual work decreased “quite considerably,” leaving only a “small amount of money left to start habitat status indicator work.” She said the funding went from approximately \$300,000 per year to \$50,000 per year. The HWG therefore chose to start with a few watersheds where it thought it could work most effectively with partners. Unless there is a reallocation of funding,

Ms. Reid said she is not optimistic that OHEB will have the resources to complete this work over the next couple of years.²⁰¹ Neil Schubert, head of the Freshwater Ecosystems Section, DFO Science, and co-chair of the Cultus Sockeye Conservation Team, told me that, although habitat status reports would be useful, OHEB’s very limited budget prevents it from completing this exercise.²⁰²

Mr. Young said that the absence of habitat assessments to date has resulted in “a lack of information coming from that strategy that would then be useful to either CU planning for recovery, for example, or applying that information to other habitat responsibilities of the Department.”²⁰³

Work under Action Step 2.2 has been focused only on habitat indicators in freshwater environments.²⁰⁴ A 2009 peer-reviewed paper, *Canada’s Policy for Conservation of Wild Pacific Salmon: Stream, Lake and Estuarine Habitat Indicators*, written by Ms. Stalberg and others, documents the methodology DFO used to identify Strategy 2 habitat indicators, metrics, and benchmarks for freshwater environments and provides a proposed list of indicators considered useful for describing salmon habitat condition or “man-made” stressors on those habitats.²⁰⁵ Mr. Young called this work excellent.²⁰⁶

The habitat indicators developed in the 2009 paper are not being actively used on a general operational basis in the BC interior. Jason Hwang, area manager, OHEB, BC Interior, noted that, although there have been pilot exercises to test or validate these indicators, mobilizing this work would take considerable effort, given the scale of geography and the complexity of indicators. He does not see an opportunity to do it in the near future. Mr. Hwang testified that the tool seems reasonable and functional, and that an important next step would be to gather baseline habitat data in order to determine whether habitat objectives (such as those under the 1986 Habitat Policy) are being met.²⁰⁷ As well, Mr. Young expressed concern that the habitat assessment methodology was not being implemented, with only a small number of habitat assessments actually conducted to date.²⁰⁸

In a presentation made on December 16, 2010, DFO staff advised the Operations Committee, a steering committee created in the region to deal with a number of “change initiatives,” including the WSP, that Action Step 2.2 habitat indicators

were finalized but that DFO lacked resources to develop habitat benchmarks.²⁰⁹ The benchmarks are intended to reflect the desired values for each key indicator. They reflect DFO's stated intent to protect and restore habitats on a preventive basis, before populations decline in response to degraded habitats.²¹⁰ Staff also advised the Operations Committee of significant perceived "gaps" in the implementation of Action Step 2.2. These gaps included the lack of collection of habitat status information and of monitoring the health of freshwater and marine habitat, the need for "better linking [of] habitat management strategies to harvest and salmon assessment (Strategy 4)," a lack of resources to monitor habitat status, and the need to engage partners on monitoring. The presentation also stated that habitat status monitoring is not a priority for the national Habitat Management Program.²¹¹

DFO has yet to identify nearshore marine and marine habitat indicators. Ms. Stalberg testified that it was simply a matter of workload and timing that only freshwater and estuarine indicators have been completed; the intention is to move forward with nearshore marine indicators.²¹² I heard evidence of a lack of knowledge in DFO around the marine environment for Fraser River sockeye, as I discuss in more detail in Chapter 6, Habitat management, and in Volume 2. These knowledge deficiencies have an impact on the implementation of the WSP.

Mr. Crowe stated:

Essentially, the Habitat Management Program objective is to protect and conserve fish and fish habitat, so essentially we are trying to deliver the key objective of the policy which is the conservation of wild salmon stocks or conservation units.

With regards to Wild Salmon Policy processes, the habitat component is really dependent on having, under Strategy 2, a very good inventory of habitat values based on assessment studies and understanding of indicators and overall habitat condition. We essentially don't have a lot of that basic information. So

while we're working towards the spirit and intent of WSP, I would say we're not doing it directly within the manner that WSP envisions or intends.²¹³

Action Step 2.3 commits DFO to conduct ongoing habitat monitoring to provide four key inputs to guide salmon habitat management. It should identify

- important habitat in need of protection to maintain salmon productivity;
- habitat risks and constraints that are adversely affecting that productivity;
- areas where habitat restoration or rehabilitation would be desirable to restore or enhance productivity; and
- investigations needed to fill information gaps.*

Under Action Step 2.3, the department has hired an outside contractor to develop a monitoring framework, with David Carter, regional monitoring lead, Habitat Monitoring Unit, OHEB, as a reviewer.²¹⁴ Mr. Carter testified that the Habitat Monitoring Unit is currently not using Strategy 2 habitat indicators.[†] He said that the unit would have the ability to use some of the physical status indicators (such as temperature), but that capacity would be an issue. He also said he had been told that the Habitat Monitoring Unit will likely incorporate WSP habitat monitoring into its work. Although WSP habitat monitoring has not been raised with him at the national level, he testified that there has been more of an ecosystem-based approach at the national level, which "sounds very familiar to some of the strategies within WSP."²¹⁵

I heard evidence from DFO witnesses suggesting that the disconnect between the WSP and OHEB is most prevalent with respect to Action Step 2.3 environmental monitoring. Mr. Carter noted that environmental monitoring under the WSP is based on the watershed and the status of that watershed, while under Habitat Compliance Modernization the monitoring has been on a project-by-project basis.²¹⁶ Ms. Stalberg testified that the 1986 Habitat Policy does not include OHEB delivering Strategy 2

* Exhibit 8, p. 21. As stated at p. 22 of the policy, these inputs are intended to guide both integrated strategic planning and annual operational plans for habitat management, including compliance and regulatory functions. See also Chapter 6, Habitat management.

† The Habitat Monitoring Unit has 12 people and includes monitoring staff, biologists, and technicians in each area, all of whom report to Mr. Carter with regard to monitoring. See Chapter 6, Habitat management.

environmental monitoring, nor is OHEB set up to carry out such work.²¹⁷ She went on to note that, with the 1986 Habitat Policy under review, it would be helpful to embed references and opportunities to support environmental monitoring.²¹⁸ However, similar to the overlap between WSP habitat indicators and the 1986 Habitat Policy mentioned above, I note that the 1986 Habitat Policy should overlap with the WSP environmental monitoring through the 1986 Habitat Policy's habitat monitoring implementation strategy. Although OHEB is focused on project-by-project monitoring, the 1986 Habitat Policy also requires effectiveness and fish habitat health monitoring, but this work is not currently being done.²¹⁹ For further discussion of the 1986 Habitat Policy, see Chapter 6, Habitat management.

Ms. Stalberg noted that the WSP calls for an evolution and transition in the delivery of programs, so it depends on support from interested partners to help facilitate the shift.²²⁰ She also said that the pace of implementation is currently based on resourcing, and, as any additional funding will most likely be gained nationally, Strategy 2 monitoring must fit within the national agenda.²²¹

Both Ms. Farlinger and Mr. Saunders testified that, in order to fulfill Strategy 2 monitoring, it is necessary to engage external partners.²²² Mr. Saunders noted that multiple parties, including the tens of thousands of stream-keepers throughout the province, the Salmon Enhancement Advisory Board, and First Nations communities, have expressed a strong interest in participating in this work.²²³ Dr. Kim Hyatt, the DFO research scientist who is DFO's lead for ongoing development and implementation of WSP Strategy 3, gave his opinion that the degree to which WSP monitoring and assessments are successfully implemented will depend on the level of engagement with other levels of government and external parties, including NGOs.²²⁴ Similarly, Mr. Young testified that external partners are necessary to fulfill the monitoring requirements under strategies 1 and 2 and that, in his view, maintaining the monitoring required is one of the key potential constraints within the department.²²⁵

Action Step 2.4 states that DFO, together with British Columbia and other partners, will "promote the design, implementation, and maintenance of a linked, collaborative system to increase access to information on fish habitat status."²²⁶ Under this

action step, the HWG developed a "WSP habitat web-mapping application." In 2008, OHEB requested a three-year funding commitment from the Regional Management Committee toward developing this application, but it was not provided.²²⁷

The application was launched in April 2009 and is accessible internally and to the public.²²⁸ Ms. Stalberg explained that its purpose is to provide public access to CU maps so people can understand what a Conservation Unit is on a spatial scale. The application is electronic and provides information associated with each CU, including any overview and habitat status reports.²²⁹ However, the presentation to the Operations Committee in December 2010 states that this web-mapping tool alone is inadequate as an "integrated data system" which could inform watershed management.²³⁰

Ms. Stalberg also said that OHEB has met with the province about data sharing, with a view to synchronizing efforts and improving efficiencies.²³¹

Strategy 3: Inclusion of ecosystem values and monitoring

Strategy 3 is designed to provide scientific understanding and technical capacity to include ecosystem values in salmon management. It has two action steps, 3.1 and 3.2.

Action Step 3.1 provides:

The Department will use existing data and expert advice to identify key indicators (biological, physical, and chemical) of the current and potential state of lake and stream ecosystems (diversity of organisms, rates of biological production, etc.). Within two years, an ecosystem monitoring and assessment approach will be developed and integrated with ongoing assessments and reporting on the status of wild salmon.²³²

Action Step 3.1 addresses the development of key indicators for lake and stream ecosystems, with a view to integrating an ecosystem monitoring and assessment approach into ongoing assessments and reporting. Action Step 3.2 is intended to link and integrate information on climate and ocean systems with freshwater monitoring to improve management. The Wild Salmon Policy calls for a two-year

period for Strategy 3 implementation.²³³ That period expired more than five years ago.

Strategy 3 development and implementation has been largely led by two DFO scientists, Dr. Hyatt and Dr. Irvine.²³⁴ Dr. Hyatt testified that he has been the major conceptual developer of the ecosystem monitoring and assessment framework under Action Step 3.1 and that he spent 30 percent of his time on the Barkley Sound pilot (see below), 20 percent on the WSP Implementation Team, and the remaining 50 percent on research that informs ecosystem-based management of wild salmon.²³⁵ Dr. Irvine testified that he has been principally involved in the implementation of Action Step 3.2 as the co-chair of the Fisheries and Oceanography Working Group, which publishes the annual *State of the Pacific Ocean* reports. He said that he spends about 40–45 percent of his time on Strategy 3 implementation.²³⁶

Dr. Irvine testified that limiting factors in implementing Strategy 3 (as well as the WSP generally) include lack of strong leadership and direction from senior management within the region and uncertainty as to how particular aspects of the WSP are to be implemented, including how strategies relate to each other.²³⁷ Dr. Hyatt discussed the complications of overlapping jurisdiction. He said that, in certain watersheds, the province and the federal government have shared authority over operational ecosystem units. In international waters, the North Pacific Anadromous Fish Commission has shared authority on the high seas. Also, as I discuss further in chapters 3, Legal framework, and 5, Sockeye fishery management, Canada's Pacific Salmon Treaty with the United States requires a partnership arrangement to address ecosystem integrity within transboundary waters. Dr. Hyatt said that joint action is required in many of these zones in order to make headway in identifying Strategy 3 objectives and also in regard to the indicators of ecosystem integrity within each of these zones.²³⁸

DFO witnesses were hesitant to give a definitive answer as to when the implementation of Strategy 3 would be complete. Dr. Hyatt testified that Strategy 3 will be “a long time in development, in testing, and in refinement, because it challenges the department to do things that historically it has not seen as its mandate.” In addition, he said, there is not a single point at which Strategy 3 will be implemented because the process will be ongoing for as long as the WSP is in place. He noted that certain aspects of

ecosystem-based management are already incorporated in the management of wild salmon, some of which were initiated before the WSP. Managing wild salmon according to an ecosystem-based approach is, he said, not an “all or nothing proposition” but one that happens incrementally and becomes increasingly complex and informative as you go forward. The implementation of Strategy 3 has also been influenced by the implementation of other strategies in the WSP. Dr. Hyatt explained that the CU methodology and actual identification of Conservation Units must be specified before Strategy 3 freshwater and marine ecosystem units can be identified. Although the WSP acknowledges interdependencies among the strategies, the writers of the WSP, in his view, did not envision “just how interdependent these strategies would be.”²³⁹

The Barkley Sound pilot is a program to refine and test strategies 1 through 5. Over 2010, Dr. Hyatt worked on the Barkley Sound pilot to demonstrate how Strategy 3 can be implemented in a way that is both informative and affordable.²⁴⁰ This pilot is funded by different sectors within DFO, and Dr. Hyatt testified that, because of capacity and financial issues, these sectors have not been able to commit resources to accelerate the pilot.²⁴¹ He said that many lessons relating to policy development and on-the-ground implementation of Strategy 3 have been learned from the Barkley Sound pilot, which was not expected to be completed by the end of 2011. He also said that no end date has been identified for the pilot, noting that, if the pilot continues with the allocated existing resources, it will be a long time before completion.²⁴²

Dr. Hyatt developed a conceptual framework for Strategy 3 and presented it to the Operations Committee on October 8, 2009. Its purpose was to provide a framework with the necessary definitions and key elements required to move forward in implementing this strategy.²⁴³ Dr. Hyatt testified that the committee was satisfied with the concepts and gave approval to move forward with the actual implementation.²⁴⁴ The concept includes a five-step approach to Action Step 3.1 to develop the ecosystem objectives and indicators:

- step 1, to define operational ecosystem units;
- step 2, to determine the reference state;
- step 3, to identify sector-specific ecosystem-based management objectives;

- step 4, to develop indicators; and
- step 5, to develop a monitoring plan.²⁴⁵

Although the rudiments of an ecosystem monitoring and assessment approach have been created, the approach had not been finalized as of December 2010.²⁴⁶ Mr. Saunders testified that progress had been made with respect to Action Step 3.1, noting that there has been a substantial amount of consultation and that the department was working toward preparing a discussion paper. He did not know when this work would be completed.²⁴⁷ Similarly, Dr. Irvine testified that, although the development of operational ecosystem objectives had yet to be developed into a scientific publication, work has been done on their development, such as Dr. Hyatt's work on the Barkley Sound pilot and in the Okanagan. He said that the operational ecosystem objective work has been focused on various sectors, including enhancement and aquaculture.²⁴⁸

With respect to Action Step 3.1, Dr. Richards testified that there is ongoing work nationally on the issue of ecosystem indicators, noting in particular the CSAS national review meetings planned on indicators for freshwater systems. She remarked on the huge body of science and scientific debate around determining indicators, and she observed that this work has been challenging.²⁴⁹ Mr. Shepert said that, although the Upper Fraser River First Nations have a deep interest in developing Strategy 3 ecosystem indicators, DFO appeared to have made little progress on these indicators, which "just seem to languish somewhere."²⁵⁰

Dr. Hyatt's Strategy 3 implementation approach is not being applied to Fraser River sockeye. In December 2010, staff advised the Operations Committee that work was under way to develop ecosystem objectives and indicators for Barkley Sound.²⁵¹ However, there is no evidence before me that ecosystem monitoring and assessment, under Action Step 3.1, have been implemented for Fraser River sockeye or their ecosystems.

Action Step 3.2 is intended to link and integrate information on climate and ocean conditions with freshwater monitoring to improve knowledge of production dynamics and salmon management. This step also contemplates continuing co-operation internationally and domestically to assess the magnitude and spatial scale of changes in climate

and ocean conditions, including the requirement of large-scale monitoring programs.²⁵²

Dr. Irvine explained the work of the Fisheries and Oceanography Working Group, a multidisciplinary group that includes scientists from within the department, various universities, other governmental departments, and the US Pacific Northwest. He said that the working group meets annually to discuss how research by the various members is interrelated. In addition, each year it publishes the *State of the Pacific Ocean* report.²⁵³ This report provides an annual snapshot of conditions in the Pacific Northwest and links the physical, chemical, and biological perspectives of the ocean to the ecology of the fish community.²⁵⁴

With respect to Action Step 3.2, Dr. Irvine said that the goal is to improve DFO's ability to link changes in the marine environment to changes in the survival and production of Pacific salmon. He noted that it has been beneficial to work with oceanographers in addressing Step 3.2. Dr. Irvine also said that members of the Fisheries and Oceanography Working Group are in regular contact with the IHPC (which gives an annual outlook on the status of salmon), in order to integrate information on climate and the ocean into the salmon management and assessment process. Although the work of the Fisheries and Oceanography Working Group and the *State of the Pacific Ocean* reports are significant steps in the process, Dr. Irvine said they are not sufficient to implement Action Step 3.2.²⁵⁵

With respect to the implementation of Action Step 3.2, Mr. Saunders testified that there has been great uncertainty in linking the high-seas and open-ocean conditions to productivity of salmon. Although this area has recently advanced rapidly, he said, it is still very much under development. Mr. Saunders also described advancing technologies, such as satellite imagery, which have facilitated the understanding of real-time information on changing conditions collected by hundreds of drifting sensors that are now located in the North Pacific.²⁵⁶ Dr. Irvine said DFO must do a better job of incorporating information from the marine environment in understanding salmon survival and prediction of unusual events, such as those that occurred with the Fraser River sockeye in both 2009 and 2010.²⁵⁷ He agreed with Dr. Hyatt that the process of implementing Strategy 3, including Action Step 3.2, will go on for as long as DFO is managing salmon.²⁵⁸

Strategy 4: Integrated strategic planning

Strategy 4 contemplates integrated strategic planning for management of Pacific wild salmon, as set out in the introductory text:

The purpose of Strategy 4 is to develop long-term strategic plans for CUs and groups of CUs and their habitat subject to common risk factors. These plans will account for their biological status and provide recommendations on salmon conservation that reflect the interests of people at local and regional levels. Strategies 1, 2 and 3 will provide information on the status of the CUs, their habitat and the ecosystem as inputs to the planning process. However, strategic plans need to integrate this information and:

- Specify long-term biological targets for CUs and groups of CUs that ensure conservation and sustainable use;
- Identify recommended resource management actions to protect or restore Pacific salmon, their habitats, and ecosystems in order to achieve these targets; and
- Establish timeframes and priorities for action.²⁵⁹

Strategy 4 describes the outcomes of strategic plans:

The preferred long-term outcomes of the plans will be healthy habitat and ecosystems and CUs above their higher benchmarks. But as a minimum, the plans must be capable of maintaining and restoring all CUs above their established lower benchmarks with an acceptable degree of certainty within a defined time frame.²⁶⁰

As discussed in further detail below, Strategy 4 includes two action steps to achieve the goal and objectives of the policy: an interim process for management of priority CUs (Action Step 4.1) and a fully integrated strategic planning process for salmon conservation and management (Action Step 4.2).

Mr. Chamut said the Wild Salmon Policy was intended to inform all components of fisheries management, including in-season management. When the WSP was under development, he had

anticipated that with the WSP, it “would definitely not be the *status quo* when it comes to managing the resource on an annual basis.” He envisioned that, under the policy, DFO would rebuild Conservation Units at a low abundance. He thought that would require changes to the way fisheries were conducted, including seasonal closures, moving fisheries from outer coastal areas into more terminal areas, and fishing more selectively.²⁶¹ In his view, DFO cannot have the policy and also continue to manage Pacific salmon fisheries as it has done in the past.²⁶²

A panel of four witnesses testified specifically on Strategy 4 and integrated strategic planning under the Wild Salmon Policy: Mr. Saunders, Mr. Ryall, Mr. Morley, and Mr. Young. In addition, I heard evidence touching on Strategy 4 and its implementation through witnesses at other points in the Inquiry.

It was clear to me, as I listened to the evidence throughout this Inquiry, that Strategy 4 is a critical part of the Wild Salmon Policy. It has not been adequately implemented, and this lapse has given rise to many of the frustrations I heard about DFO’s commitment to the policy.

Mr. Young described Strategy 4 as a key component of the WSP.²⁶³ Mr. Morley said Strategy 4 is

really the guts of the Wild Salmon Policy. It’s where the rubber hits the road. All this stuff preceding that is really just – it’s not where you sit in the red or the yellow or the green zone. It’s what you do about it when you’re there and that’s all about Strategy 4.²⁶⁴

Ms. Farlinger similarly testified that Strategy 4 is “where the nub of it is, where the hard work is.”²⁶⁵

Mr. Saunders explained that the purpose of Strategy 4 is to address how conservation and biodiversity issues will be integrated with other social and economic interests, to talk about the implications of options, and to find a “net positive result in all three accounts, ecological, social and economic.”²⁶⁶ Using the five-step process in Appendix 2 of the WSP, and subject to final approval by the minister of fisheries and oceans, resource users, First Nations and stakeholders would work to build consensus on escapement targets or other management actions. Dr. Riddell said the groups that want to have input into long-term strategic plans for salmon, under Strategy 4, include the provincial government, municipal governments,

First Nations, and community groups.²⁶⁷ To this list I would add commercial and recreational harvesters.

Witnesses generally agreed that the implementation of Strategy 4 is contingent on first having information arising from strategies 1, 2, and 3.²⁶⁸ Mr. Young explained that operational management consistent with the Wild Salmon Policy has been delayed by a lack of information from strategies 1–3:

Without having conservation units defined with benchmarks and an understanding of the status relative to those benchmarks ... you don't have essentially the core information you need to then decide what to do, particularly about those CUs below the lower benchmark ... *So without that information, you're quite limited, I guess, in terms of what you can really do consistently with the Wild Salmon Policy.* [Emphasis added.]²⁶⁹

Dr. Riddell was especially concerned by the slow pace of implementing Strategy 4. He noted that the longer it “languishes,” the less enthusiasm stakeholders have for the change it entails. While Dr. Riddell saw Strategy 4 as a potentially effective management framework, he said it needs to move forward more quickly for people to appreciate its value.²⁷⁰ Mr. Young agreed, emphasizing that the information gathered under strategies 1 and 2 would be “of great value to proceeding with Strategy 4 planning.”²⁷¹ Dr. Riddell said the policy could not be effectively implemented without commitment to Strategy 4.²⁷²

Mr. Ryall testified that DFO had meetings specific to Strategy 4 with First Nations and others – for example, meetings on the Fraser River Sockeye Spawning Initiative (FRSSI, discussed in detail below and in Chapter 5, Sockeye fishery management), some meetings in the Skeena watershed, and the Barkley Sound public meetings.²⁷³ Briefing materials presented by DFO staff to regional management in April 2011 asserted that there had been significant internal and external engagement around strategic planning.²⁷⁴

Mr. Morley testified, however, that there had not been any meetings with DFO on implementing Strategy 4, other than “a couple of the cases they call pilots of implementation being the Skeena watershed process and the FRSSI process, but no real general discussion about how this should happen.”²⁷⁵ Mr. Young agreed with Mr. Morley, though he noted that environmental

groups had met with DFO to discuss their own publications on Strategy 4.²⁷⁶

The Strategic Directions Committee (SDC), a subset of the Regional Management Committee, met on April 14, 2011, to discuss Strategy 4. This committee is chaired by the regional director general and its members are drawn from senior management in the Pacific Region, including regional directors from FAM, Science, and operational branches, and area directors.²⁷⁷ The information presented to the SDC and the log of that meeting, together with witnesses’ answers to questions about that information, contribute to my understanding of the current state of progress on Strategy 4.²⁷⁸

Action Step 4.1 is described as an interim process under the Wild Salmon Policy. It requires that, for priority CUs, DFO will bring together “response teams,” which are proposed to include First Nations and various local and regional interests. In collaboration with DFO, response teams will gather and consider information from all sources and provide recommendations aimed at rebuilding priority CUs beyond their lower benchmark. This response team process is to be used until DFO creates a new planning structure for the development of long-term strategic plans under Action Step 4.2.²⁷⁹ The requirement to form response teams has been acknowledged by DFO staff in efforts to implement Strategy 4. For example, in 2007, DFO regional management was advised that, “[w]hile the Department does not have the information and capacity to immediately form Response teams and develop plans for all Priority CUs, the Department must begin to take action.”²⁸⁰

Between 2006 and 2011, DFO staff made efforts to resolve the issue of identifying priority CUs and, on several occasions, brought the issue to the attention of regional management.²⁸¹ These efforts, which typically identified at least some Fraser River sockeye CUs, including Cultus Lake and Early Stuart CUs, did not appear to be based on an assessment of biological status conducted under Action Step 1.3, such as the preliminary status assessment in Grant Draft 2010.²⁸²

By June 2011, DFO had still not identified any priority CUs, despite having at least three assessments showing that a number of Fraser River sockeye CUs had critical or poor status.²⁸³ The 2011 SDC Action Log says that discussion on the identification of priority CUs should happen at SDC “at a later date” and build “on work underway by FAM and Science to develop draft list of priority CUs

(e.g. Science ‘synoptic assessment’).²⁸⁴ As shown by FAM’s April 2011 Briefing Note to the SDC, a key item for the committee’s discussion was the question: “Is there support for identifying high ‘priority CUs’ as envisioned under Action Step 4.1 and the proposed longer-term approach?”²⁸⁵

Mr. Saunders said that DFO does give attention to various “stocks of concern” in the development of its Integrated Fisheries Management Plans (IFMPs), through the Salmon Stock Outlook, and in research.* He concluded: “[D]o we prioritize works and actions related to CUs? Yes, we do. Have we specifically identified priority CUs as identified in the Policy? No, we have not.” Mr. Saunders said that it was absolutely DFO’s intention to identify priority CUs.²⁸⁶

According to Mr. Saunders, DFO and First Nations had many discussions about the words in the Wild Salmon Policy that required DFO to consult with First Nations and bring together the various interests from existing processes to provide recommendations for protection and restoration of priority CUs.²⁸⁷ However, Mr. Morley and Mr. Young both said they had never been consulted on the process for identifying priority CUs.²⁸⁸ Mr. Ryall was unsure whether DFO intended to consult on the identification of priority CUs, and Mr. Saunders was not aware of any plan to do so.²⁸⁹

At the time of the hearings, a number of CUs had been identified and assessed as having red or amber or “poor status” by various DFO scientists, as well as by the authors of Technical Report 3, Freshwater Ecology.²⁹⁰ Mr. Saunders agreed that work could now begin to identify priority CUs from the lists.²⁹¹ Mr. Ryall, however, was struck by the differences among the lists and preferred a scientific review of the various potential lists to produce a single determinative list.²⁹²

The Cultus Lake CU has not been identified as a priority CU under the WSP. Nevertheless, attention has been paid to this population for some time, pre-dating the WSP. I discuss the Cultus Lake CU in some detail in Chapter 11, Cultus Lake, as an example of planning for a population at risk. In relation to Step 4.1, I heard evidence about the Cultus Sockeye Recovery Team as an example of what such a process could look like.

Witnesses debated whether the FRSSI planning process or the Cultus Sockeye Recovery Team were forms of Step 4.1 planning. Mr. Ryall initially testified

that FRSSI was a team akin to the response teams required under Action Step 4.1, though he later conceded that the FRSSI process is not a response team for any particular CU.²⁹³ Mr. Young and Mr. Morley did not agree that FRSSI could be considered a response team under Action Step 4.1.

Mr. Young testified that “[m]y interpretation of a response team from Strategy 4 in the Policy is to deal specifically with CUs of concern.” In his view, the closest thing to a response team would be “some of the elements that came together around Cultus, although that wasn’t really a Wild Salmon Policy-based initiative, and it also doesn’t really fully meet the definition of [a] response team.”²⁹⁴ Mr. Morley said, “I would totally agree with Jeffery [Young]’s characterization of the response teams, and I wouldn’t call the Skeena Watershed process or FRSSI a, quote, response team.” He agreed that “Cultus could be looked at that way, but again nothing formal with respect to the Strategy 4 of the Wild Salmon Policy, for sure.”²⁹⁵

DFO witnesses identified certain current planning processes as relevant to the implementation of Strategy 4. The WSP says that interim procedures for strategic planning (Action Step 4.1) will build on the approach used to develop IFMPs for salmon.²⁹⁶ In evidence before me, FRSSI, the IHPC, and the IFMP were all discussed as potential forums for the integrated planning required under Step 4.2 (see Chapter 5, Sockeye fishery management).

Current planning processes in the context of the WSP

In Chapter 5, Sockeye fishery management, I discuss in detail the escapement planning model known as FRSSI, the IHPC, and the IFMP. Although I do not repeat the discussion of these processes here, I note that each of them has a role in harvest planning and, as such, has relevance to the implementation of the WSP. I also note that the policy states that interim procedures for strategic planning will build on the approach used to develop IFMPs for salmon.²⁹⁷ Similarly, the WSP (under Strategy 5) notes that annual fisheries management measures will be identified in IFMPs and that input on decision rules for harvesting will be sought from First Nations and the IHPC.²⁹⁸

* Transcript, June 3, 2011, p. 7. For full discussion of IFMPs and the Salmon Stock Outlook document (Exhibit 947), see Chapter 5, Sockeye fishery management.

FRSSI and the use of aggregate Conservation Units

Conservation Units are the scale at which a stock's status is assessed under the WSP, but the WSP does not demand that all decision making for fisheries, habitat, or enhancement be made at the CU level. Indeed, the policy contemplates aggregates of CUs for planning purposes:

Planning choices made at the aggregate level with respect to habitat, enhancement, and fisheries management measures will effectively translate into impacts on and targets for each of the individual CUs within the aggregate. However, the plan for each individual CU will reflect full consideration of the impacts on all other CUs within the aggregate.

...

Some planning units will encompass components of CUs and some will encompass groups of CUs subject to one or more common risk factors. The number and scale of these planning

units will facilitate practical and efficient planning for wild salmon.

...

The Wild Salmon Policy will not preclude fisheries operating on population aggregates that include numerous CUs, but increased attention to all of the units within the aggregate will likely require significant changes to current management practices.²⁹⁹

As discussed in Chapter 5, Sockeye fishery management, harvest planning of Fraser River sockeye has historically been implemented with respect to four run-timing groups. These groups were established for fishery management purposes and consist of populations of Fraser River sockeye which return to the Fraser River at similar times.³⁰⁰ The four run-timing groups are made up of the 19 sockeye stocks monitored by DFO, the Pacific Salmon Commission (PSC), and PSC's predecessor, the International Pacific Salmon Fisheries Commission (IPSFC). The 19 stocks do not necessarily correspond with the CUs, as identified in Grant Draft 2011, Table 2, and as set out here as Table 1.10.2.

Table 1.10.2 The 22 CUs and their corresponding stock names

	CU Name	Corresponding Stock Name
	Current	
1	Anderson-Seton-ES	Gates
2	Bowron-ES	Bowron
3	Chilko-ES ^a	Chilko
4	Chilko-S ^a	Chilko
5	Chilliwack-ES	Miscellaneous Early Summers
6	Cultus-L	Cultus
7	François-Fraser-S	Stellako
8	Harrison (D/S)-L	Miscellaneous Lates
9	Harrison (U/S)-L	Weaver
10	Harrison River (River-Type)	Harrison
11	Kamloops-ES	Raft and miscellaneous Early Summers
12	Lillooet-Harrison-L	Birkenhead
13	Nadina-François-ES (new-mixed CU)	Nadina
14	Nahatlach-ES	Miscellaneous Early Summers
15	Pitt-ES	Pitt
16	Quesnel-S	Quesnel
17	Shuswap-ES	Scotch and Seymour and miscellaneous Early Summers
18	Shuswap Complex-L	Late Shuswap
19	Takla-Trembleur-EStu	Early Stuart
20	Takla-Trembleur-Stuart-S	Late Stuart
21	Taseko-ES	Miscellaneous Early Summer
22	Widgeon (River-Type)	Miscellaneous Lates
	<i>De Novo (New)</i>	
23	Seton-L	Seton
24	North Barriere-ES	Fennell and miscellaneous Early Summers

CU, Conservation Unit; D/S, downstream; U/S, upstream; S, Summer; ES, Early Summer; L, Late; EStu, Early Stuart

^aChilko-ES and Chilko-S are aggregated for CU assessment purposes; these data sets cannot be disaggregated.

Source: Reproduced from Exhibit 1915, p. 3.

An extensive data set has been collected since the days of the IPSFC in relation to these 19 stocks, and these data have formed the basis of pre-season planning, escapement planning, and in-season harvest management to the present day. As discussed in Chapter 5, Sockeye fishery management, the historical data collected in relation to the 19 stocks are used for the productivity analysis in pre-season forecasting, FRSSI, and other models. To determine the productivity of a population, both the escapement data and the catch data are required. Catch data are estimated based on stock analysis from test fishing and sampling at specific points on the return migration of the salmon. Information from test fisheries in the marine area and at Mission are also critical in managing the in-season harvest because it allows fishery managers to understand the composition and size of the sockeye runs returning to the Fraser River. In marine test fisheries, only 0.5 to 1 percent of the run is sampled, and at Mission only 10–15 percent of the run is sampled.³⁰¹ Therefore, the chance of sampling all CUs before they reach their spawning grounds is extremely low.³⁰² This method of sampling therefore poses a challenge to managing harvest at the CU level in a mixed-stock fishery.

Dr. Riddell said that “conservation units are not going to change our management process fundamentally.” He said the Wild Salmon Policy would result in little change to in-season management, including test fisheries and the use of run-timing groups, except that assessment criteria would now relate to CUs. Rather, he emphasized that the major change in management under the policy was its requirement to interlink assessing and monitoring salmon diversity, habitats, and ecosystems.³⁰³

Witnesses were asked if they would recommend a move away from managing aggregates to managing at the CU level. Mr. Shepert said that the Fraser River Panel’s practice of analyzing Fraser River sockeye based on stock aggregates is inconsistent with the policy and that aggregate-based management is failing to conserve Upper Fraser River sockeye CUs.³⁰⁴ He added that First Nations had “spent a lot of time talking about FRSSI but that also comes with its own suite of issues and problems,” and that FRSSI’s “fundamental flaw” was its continued use of stock aggregates.³⁰⁵ Similarly, the First Nations Coalition urged me in its submissions

to recommend that DFO “develop the data to dis-aggregate the 19 forecasted stocks, so that individual CUs can be considered and forecasts can be better aligned with that of the WSP.”³⁰⁶

Mr. Young said that there are opportunities to manage at an aggregate level, but that the aggregates must be assessed to determine whether the fishing pressure is the same across all Conservation Units in the aggregate, to ensure that all component CUs are adequately protected.³⁰⁷ Dr. Riddell testified that, although harvest decisions will be made at the aggregate level, the consequences of fishing at an aggregate level must be assessed at the CU level because “component conservation units will respond differently to different fishing pressures.”³⁰⁸ Mr. Morley, using Cultus Lake as an example, expressed caution that, if exploitation rates are dramatically reduced across run-timing groups to protect CUs in the red zone, it could mean the end of fisheries in the approach areas, leaving fisheries only in the areas beyond the spawning grounds of the CUs at risk.³⁰⁹

As discussed earlier in this Report, FRSSI is a harvest management tool, comprising both a computer model and a consultative process. It is designed to set escapement goals for the four run-timing groups currently managed by DFO and the PSC. Using data from the 19 stocks, the FRSSI model simulates, 48 years into the future, the application of different escapement strategies to each run-timing group and tracks the performance of these escapement strategies against certain defined performance measures.³¹⁰ Key performance measures include the probability of a population not meeting an escapement benchmark (avoiding low spawning abundance), the probability of the realizable harvest being less than 1 million fish (described as a socio-economic indicator), and the probability of a four-year average of spawners being lower than a particular benchmark for abundance.³¹¹

FRSSI uses a form of stock-specific escapement benchmark in assessing performance indicators. Benchmarks used in the FRSSI process are called “interim benchmarks,” to distinguish them from the CU benchmarks contemplated by the Wild Salmon Policy. The intention is that these FRSSI benchmarks will be reviewed for consistency with the Wild Salmon Policy benchmarks when they are established.³¹²

Once the FRSSI model has been run with the different escapement strategies, the impact of those different strategies on the performance indicators is intended to be discussed with stakeholders, primarily in the IHPC process and bilaterally between DFO and First Nations. Ultimately, a choice is made as to which escapement strategy will be chosen for each run-timing group, and this choice is implemented in the IFMP.

There appeared to be some confusion among witnesses and participants as to how the WSP and the FRSSI benchmarks relate to harvest decision rules. Whether FRSSI uses the current interim benchmarks or in the future uses WSP benchmarks, those benchmarks do not determine the harvest rule for any given stock or CU. The benchmarks are an input into the model, and the model creates probability scenarios that will result from proposed escapement strategies. The decision as to what escapement strategy will be used follows discussion of the probability scenarios and is implemented in the IFMP through incorporation of the total allowable mortality (TAM) rules. As such, the WSP benchmarks are distinguished from reference points, in that the benchmarks do not dictate a specific fishery decision. The TAM rules are more similar to the concept of reference points as the TAM rules describe what fishery decision will be taken at a specific run size.

The confusion between WSP benchmarks and harvest decision points was seen in the submission of the West Coast Trollers Area G Association / United Fishermen and Allied Workers' Union (UFAWU), which urged me to recommend "[t]hat the WSP upper benchmark be applied as an upper limit in a manner similar to the application of the upper limit in Alaska so as to mitigate the pronounced decrease in productivity resulting from escapement that exceeds carrying capacity."³¹³ The current maximum harvest limit results not from the WSP upper benchmark but rather from the TAM rule, which sets a maximum mortality rate at 60 percent of the run, or from constraints resulting from weak stocks co-migrating with stronger stocks.

Ms. Farlinger characterized FRSSI as a WSP pilot intended to determine "potential interim reference points for Fraser stocks based on existing information."³¹⁴ Mr. Cass argued that FRSSI "met the test" of a WSP pilot, and Mr. Ryall said that FRSSI was a pilot for implementing Strategy 4.³¹⁵

Mr. Ryall noted that FRSSI used the five-step planning procedure set out in Appendix 2 of the WSP.³¹⁶ He continued:

[I]t's my view that the FRSSI process does represent a Wild Salmon Policy implementation and why do I say that? Is it perfect? No. That's not my testimony. It's not perfect and it doesn't encompass everything ... I would agree with Mr. Young and Mr. Morley that it doesn't include the habitat and ecosystem parts, but it includes a very important part of Wild Salmon Policy which is specifying biological targets for conservation units and groups of conservation units to ensure conservation and sustainable use.³¹⁷

Mr. Young disagreed with Mr. Ryall. In addition to his view that FRSSI does not focus on the recovery of specific priority CUs, he stated:

With respect to FRSSI and the management of the Fraser sockeye fisheries I do not see the four timing aggregates as consistent with that definition of a management unit [under the WSP] for a number of reasons. One is that ... it is not reflective of the component CUs; two, assignment of the stocks that are used in that, I think, is problematic. I think it's fairly loosely associated with timing. I think there's some stocks that are kind of misassigned ... and that as a result exploitation rates targeting on one management unit do not result in a consistent impact on component CUs or the stock CUs there, so that's one problem.³¹⁸

Mr. Morley generally agreed with Mr. Young and said that FRSSI is "focused really on harvest management and clearly not comprehensive in the way the Wild Salmon Policy would indicate you should be planning under Strategy 4."³¹⁹

Dr. Riddell stated that FRSSI's "current spatial structure doesn't take into account fully the conservation units of Fraser sockeye," but he said that, once CUs and CU benchmarks were in place, it would be just an analytical adjustment. However, he noted that FRSSI, by changing harvest rates, already does take into account some issues of mixed-stock conservation and protection of biodiversity.³²⁰ Concerns with respect to the adequacy of FRSSI relate in many cases to measures not fully evaluated

by the model and include direct inputs with respect to freshwater habitat status, marine habitat, and detailed socio-economic analysis.

Mr. Morley said he has requested that evaluations of the value of “forgone” harvest form part of the FRSSI deliberations. He explained that FRSSI stakeholders had also requested that, rather than FRSSI’s 60 percent total allowable mortality rate on populations, DFO consider alternatives of “some kind of maximum fixed number of spawners in any one system” on which to base an analysis of the biological, social, and economic impacts.³²¹ Mr. Morley stated that “the way in which socioeconomic analyses have been done within FRSSI is not adequate with respect to what I would expect to see under Strategy 4.”³²²

Mr. Cass testified that the FRSSI model “melded well with the intent of the Wild Salmon Policy.” He noted that, when the WSP was released, the FRSSI model was recognized as meeting the “standards” of the WSP, specifically with respect to Strategy 1. It also adhered to Appendix 2 of the policy, in that it was designed to be “open and transparent, consistent and involve stakeholders and user groups ... as well as environmental groups that had an interest in the resource.”³²³

Ms. Stalberg said she had generated an information piece for FRSSI setting out the way that habitat status might be incorporated into it, but that she did not know if DFO had ever integrated habitat status information into Strategy 4 planning and decision making so as to protect salmon habitat.* Mr. Cass testified that FRSSI does not currently incorporate habitat status and productivity information, except indirectly in that spawner recruitment figures will be partly dependent on the habitat, given that habitat capacity is at the very root of the stock recruitment analysis.³²⁴ Ken Wilson, a consulting fisheries biologist and a member of the Fraser River Panel, testified that productivity changes related to habitat damage or loss may already be reflected within the data set used in the FRSSI model, but that the model does not incorporate assumptions about future habitat improvements.³²⁵

In Mr. Cass’s view, DFO should be open to change the direction of FRSSI if necessary. If habitat, for instance, ought to be incorporated, he suggested that such recommendations be considered.³²⁶

IFMP and IHPC relationship to Strategy 4

The IFMP implements the harvest strategies developed through the FRSSI and IHPC processes. Mr. Ryall referred to the IFMP when questioned about DFO’s implementation of Strategy 4.³²⁷ Mr. Ryall said that DFO was already addressing weak stocks in harvest management by reducing harvest rates in marine waters and the Lower Fraser River and setting clearer decision rules within the annual IFMP.³²⁸ He thought the IFMP would continue to identify stocks of concern rather than CUs and to implement harvest management decision rules.³²⁹ He also believed that the long-term goals and objectives found in integrated strategic plans “are going to work themselves into the Integrated Fishery Management Plans which are currently on an annual basis.” He speculated that IFMPs could become multi-year documents.³³⁰

Barry Rosenberger, area director, BC Interior, DFO, and Canadian chair, Fraser River Panel, PSC, said that planning processes under the WSP would be implemented largely within DFO’s existing processes, which would need to be adapted.³³¹ Jeff Grout, salmon resource manager, Salmon Team, DFO, agreed that it would be for DFO managers of the resource to weigh conservation issues and socio-economic issues under the policy.³³²

Mr. Ryall initially suggested that the multi-stakeholder, harvest-focused IHPC was one forum where Strategy 4 planning could occur. He testified that the IHPC is not the only place where such discussions occur; they also occur bilaterally with First Nations around the development of the IFMP. He agreed that First Nations, in most cases, do not participate in the IHPC. Ultimately, he appeared to agree that the IHPC is an advisory body, rather than an integrated planning process as contemplated under Strategy 4.³³³ Mr. Young said that the IHPC is limited to harvest issues, and the implementation

* Ms. Stalberg also testified that, before January 2009, when her WSP tenure ended, DFO had not started discussing how the impact of aquaculture on habitat might be incorporated into integrated strategic planning under Strategy 4. The WSP Habitat Working Group that Ms. Stalberg coordinated until January 2009 was not engaged in aquaculture issues. See Transcript, December 8, 2010, pp. 18, 50; and Exhibit 181, p. 1.

described in the Wild Salmon Policy may have to take place in another type of forum.³³⁴

Mr. Young said that the IFMP and FRSSI were not comprehensive in considering stakeholder concerns relating to habitat and ecosystem components.³³⁵ In his view, the IFMP also needs to identify WSP conservation objectives and priorities more clearly, and the process needs improved representation from First Nations.³³⁶

Dr. Riddell testified: “The conservation units are the new stocks. These are the units of geographic production of salmon that need to be at the basis of all the integrated harvest planning discussions.”³³⁷ The IHPC is only one component of implementing the WSP. It is not a replacement for the long-term strategic planning for salmon required by the policy, which will bring in affected people, including the province, municipal governments, First Nations, and community groups.

Findings

Based on the evidence I heard, I find that current analytical techniques under the Fraser River Sockeye Spawning Initiative (FRSSI) do not allow fisheries to be managed at the Conservation Unit (CU) level in the marine areas or, indeed, in most mixed-stock fisheries in the mainstem of the Fraser River. It may be that, in the future, techniques will be developed that will allow for harvest management at a resolution as fine as CUs, but such techniques are not available today or in the foreseeable future.

I accept the testimony of Paul Ryall, former lead, Salmon Team, DFO; Jeffery Young of the David Suzuki Foundation; Dr. Brian Riddell, former division head, Salmon and Freshwater Ecosystems, DFO Science; and Rob Morley, vice-president, Canadian Fishing Company, that FRSSI, the Integrated Harvest Planning Committee (IHPC), and the Integrated Fisheries Management Plan (IFMP) are not intended to represent the long-term planning envisioned under Strategy 4. Having said so, I find that these processes are valuable tools in managing the yearly harvest and are not inconsistent with the Wild Salmon Policy.

A planning model for Strategy 4

Action steps 4.1 and 4.2 contemplate a new integrated planning model involving First

Nations as well as the province, municipalities, and stakeholders in making plans with respect to salmon habitat, health, and harvest. The Wild Salmon Policy states that the two keys to success for a new planning structure are a high degree of support and participation by First Nations at all levels, and a high degree of support and involvement of governments at local and regional levels. Achieving these goals “will require strong efforts by the Department and others to build the necessary political will and commitment for these other levels of government to support and participate in the planning process.”³³⁸

DFO has not yet created either a draft framework for a long-term integrated planning process or draft guidelines or a template for integrated strategic planning. On May 26, 2011, DFO staff proposed that “draft guidelines and templates for strategic plans” be finalized by the fall or winter of 2011.³³⁹ Similarly, the April 14, 2011, Strategic Directions Committee log states that FAM will “lead work with the Areas and other sectors to develop a template / tools to support integrated planning under Strategy 4 (e.g. common agreement on the DFO deliverable(s) for the pilots and future WSP planning processes).”³⁴⁰ DFO has not yet initiated consultation with First Nations and others on a proposed longer-term planning process.³⁴¹

Mr. Ryall testified that Sandy Fraser, a retired DFO employee, engaged by DFO on WSP implementation, proposed a template for a Strategy 4 strategic plan in a 2007 report.³⁴² According to Mr. Ryall, this template was “not meant to be prescriptive” but was “meant to be a guide of how one would develop an integrated strategic plan.”³⁴³ Non-governmental witnesses were asked if they had seen any such template for strategic planning from DFO. Mr. Morley answered that, in his view, the best template for strategic planning is found in the Wild Salmon Policy, Appendix 2, which sets out a structured five-step planning procedure. He described this template as straightforward and succinct.³⁴⁴ Mr. Young agreed with Mr. Morley that Appendix 2 provides clear guidance and recommended that it be revisited to ensure that current efforts were consistent with it.³⁴⁵

DFO staff presented their annual WSP update and proposed annual work plan to the Operations Committee or the Strategic Directions Committee in 2008, 2009, 2010, and 2011, and in each year they

noted the need to develop an integrated planning framework and strategic guidance document for Strategy 4.³⁴⁶ Over these four years, no such frameworks or guidance documents were created.³⁴⁷ Neither Mr. Morley nor Mr. Young had seen or been consulted on any regional framework for integrated planning under Strategy 4.³⁴⁸ Most recently, FAM advised the SDC that Strategy 4 implementation is challenged by the “lack of a clear or consistent governance structure for integrated planning processes.”³⁴⁹

Bruce Reid, regional manager, OHEB, testified that a planning initiative known as the Integrated Oceans Management Plan of the Pacific North Coast Integrated Management Area (PNCIMA) developed integrated planning at a much larger scale than that anticipated under Strategy 4. However, in his view, “there will be either ecosystem objectives or specific strategies for monitoring and developing indicators that may have application at a smaller scale, such as the conservation unit level scale,” and the governance model developed for that planning initiative may have some useful lessons for Strategy 4 integrated planning strategies.³⁵⁰

In addition, Mr. Crowe pointed to the Shuswap Lake Integrated Planning Process as being useful in implementing the Wild Salmon Policy over time. He described it as a vehicle for coordinating and trading off the values of different parties, as well as collecting inventory and assessment information necessary to improve decision making.³⁵¹ For a description of the SLIPP, and of PNCIMA, see Chapter 6, Habitat management.

Mr. Saunders said that establishing a collaborative governance mechanism under Strategy 4 to allow numerous governments to work together would not be a minor undertaking. In his words: “It’s not one MOU [memorandum of understanding].” Despite these challenges, he stressed that moving forward on Strategy 4 integrated planning was absolutely essential.³⁵²

According to Mr. Ryall, the FRSSI process over the last few years used the planning model set out in Appendix 2 to the Wild Salmon Policy, and DFO learned from implementing that process. Addressing how the process could be improved, he said that steps 1–3 under the planning model could be separated from the others and addressed with technical people. The outputs from that process could then be brought to a larger group of technical and non-technical people for steps 4 and 5.³⁵³

Mr. Morley had a similar view: steps 1–3 should be completed by technical teams, he said, primarily with people from DFO but also with input from First Nations and groups if they have information to contribute to the technical elements. Such a process would allow for options to be developed and the consequences of options to be evaluated. Then, at steps 4 and 5, all stakeholder groups could be brought together to discuss the implications of these options.³⁵⁴ According to Mr. Morley:

[A]ll of the major stakeholders should be kept out of it, and the only inputs at the initial steps would be technical inputs addressing some of the Strategies 1, 2 and 3, as well as some input from groups with respect to how you would evaluate the variety of potential benefits ... from different management approaches. So evaluation methods for First Nations or recreational or commercial kind of fisheries, and evaluations of other environmental benefits, input on that technique. But that the essential drafting the elements of ... a plan and laying out management alternatives, and habitat management alternatives could be done largely with technical teams much quicker and efficiently. And we would actually probably be in a position today where we’d have, having had this Policy around now for six or seven years, that we would actually have the scope of a whole variety of plans in place already, in my opinion.³⁵⁵

Mr. Morley was of the view that a more streamlined approach, as he described above, would be welcomed by the stakeholders who were burdened with too many meetings.

A socio-economic framework / guidance for use in Strategy 4 planning

One issue that was raised often in the course of this Inquiry, and highlighted in final submissions by many participants, was the need for improved socio-economic information in decision making. Strategy 4 is the place where planning is done, which accounts for socio-economic factors combined with all biological factors, and in response to input from all affected parties and levels of government.

In briefing materials and work plans in 2010 and 2011, DFO recognized the need for a decision-making framework that guides the integration of social, economic, and biological indicators under Strategy 4.³⁵⁶

With respect to social or economic frameworks to be used in WSP integrated strategic planning, Mr. Ryall said he had seen a draft national policy, dating perhaps to 2008, which listed “three tiers of social and economic analysis.”³⁵⁷ However, this document was not produced, and it does not appear to match any documents on the list of socio-economic reports that Canada says are relevant to Fraser River sockeye.³⁵⁸ Moreover, Mr. Ryall did not say that this apparent draft policy is specific to or informed by the Wild Salmon Policy.

Ms. Farlinger testified that a socio-economic study specific to the Barkley Sound pilot had been done. She also stated that economic analysis is required in developing IFMPs, and that such analysis is under way for some but not all IFMPs.³⁵⁹ She noted that an economic analysis had been done in relation to the gillnet fleet in the Skeena River, but acknowledged that there was a greater demand for socio-economic reports than for the studies that had been done to date.³⁶⁰ Ms. Farlinger also agreed generally that, in going forward with WSP implementation, socio-economic studies would be carried out through IFMPs on specific Conservation Units.³⁶¹ However, she could not confirm if any such economic analyses had been completed for any Fraser River sockeye CU.³⁶²

Witnesses testified about aspects of socio-economic guidance related to Strategy 4. Mr. Morley said that FRSSI is not adequate to address socio-economic issues under Strategy 4.³⁶³ In his opinion, DFO needs to do a more explicit evaluation of the financial costs and benefits as well as the social implications of the various management scenarios that are available. He said that economists need to be included in the process, and a professional evaluation of the socio-economic impact should be done to allow the stakeholders to quantify the impact on income and the social and environmental benefits. He stressed the need for a consistent technical evaluation, which could be done each year, going further than receiving opinions from stakeholders.³⁶⁴

Kathy Scarfo, president of the West Coast Trollers Area G Association, also talked about the

need for stakeholders and DFO to be able to assess the impact of different measures. She gave the example of the Cultus Lake CU:

If forgoing 25 million Fraser River sockeye to protect 200 Cultus is actually effective, then that's a cost / benefit analysis that we need to do, and we need to recognize that. We need to be able to say, we, as the Canadian government, gave up 25 million sockeye, worth however much they are, because we want to protect those 200. But the general public should then also be able to say, “Was that really effective?” Did cutting back the commercial fishery actually really do anything for Cultus? Or would we be in a better situation to harvest 25 million sockeye, maintain an exploitation rate that does not do incredible harm or irreversible harm to that stock group, and actually invest the money where the actual problem is.³⁶⁵

Mr. Morley commented that Exhibit 403 (A Framework for Socio-Economic Analysis to Inform Integrated Fisheries Management Planning and Fish Harvest Decisions, DFO Draft April 2008) had not been brought to his attention by DFO but would be “an excellent start in looking at some of the things the department should be doing in both objective-setting process in terms of spawning objectives, as well as evaluating different management plan alternatives.”³⁶⁶

DFO witnesses were asked if DFO had analyzed or considered the socio-economic implications of food, social, and ceremonial (FSC) fisheries in relation to the Wild Salmon Policy. Mr. Saunders answered, “[I]n general the social values in our integrated planning that we've attempted haven't been well-understood or reflected.” He agreed that this deficiency is one of the considerations to be folded into WSP strategic planning. He added that it would be useful to complete a foundational document on the general socio-economic approach to be used under the WSP.³⁶⁷

Witnesses also said that DFO lacks adequate in-house capacity to conduct social or economic analyses relevant to long-term planning. Mr. Morley outlined his previous experience working for DFO as director of planning for the Salmon Enhancement Program (SEP), where he had a multidisciplinary, in-house technical team of

biologists, scientists, economists, sociologists, and engineers involved in developing and evaluating a comprehensive draft plan for the SEP. The plan was then exposed to external advisory processes and consultations before being finalized.³⁶⁸

Mr. Saunders said that the economics capacity within DFO's Policy Branch had significantly increased, though he could not speak definitively on this capacity and was unsure if it was sufficient. He did not believe DFO had capacity on what he called the social side.³⁶⁹ Mr. Ryall noted that, as of 2006, DFO did not have internal economic capacity but had recently added economists to the Policy Branch.* He agreed with Mr. Saunders that "the social ones are going to be a challenge and we'll be looking externally."³⁷⁰ Specifically in the context of Strategy 4, however, Dr. Irvine testified that he felt very strongly that DFO needs more internal capacity in resource economics and in evaluating social alternatives.³⁷¹

I examine in some detail the efforts made with respect to the Cultus Lake CU, including the socio-economic analysis done in relation to it (see Chapter 11, Cultus Lake). My review of the Cultus socio-economic analysis has relevance for socio-economic work to be done under the Wild Salmon Policy.

The importance of planning that integrates the interests of First Nations and all stakeholders has been highlighted in external reports. In March 2009, the David Suzuki Foundation and the Watershed Watch Salmon Society published a report entitled *Knowledge Integration in Salmon Conservation and Sustainability Planning: Towards Effective Implementation of the Wild Salmon Policy, Strategy Four*.³⁷² Mr. Young said that, in preparing this report, these organizations hired Dr. Julia Gardner to "look at how best to potentially bring together different perspectives and stakeholders and interests around the issue of integrated planning as required under the Wild Salmon Policy."³⁷³ In May 2008, the Skeena Independent Science Review Panel released a report on the management of anadromous salmon in the Skeena Watershed.³⁷⁴ It contained the following recommendation:

There is a need to confront the major tradeoff decisions that are implied by the Wild

Salmon Policy and the impacts of mixed-stock ocean fisheries on Skeena stocks. There should be an explicit public decision about the loss of biodiversity (number of weak stocks allowed to remain overfished or at risk of extinction) that is deemed acceptable and changes required to fisheries in order to achieve particular harvest objectives. Such a decision should be based on tradeoff relationships that can now be estimated from historical data on escapement trends and exploitation rates, as shown by the examples provided in this report.³⁷⁵

Mr. Morley and Mr. Young generally agreed with this recommendation.³⁷⁶ Dr. Walters also referred to the need to make trade-off decisions when considering the impact of protecting weak stocks that co-migrate with strong stocks.³⁷⁷

Strategy 5: Annual program delivery

Under Strategy 5, there are four action steps, each of which requires annual operational activities or annual plans that implement a Strategy 4 strategic plan. Action Step 5.1 requires DFO to assume a leadership role in assessing the status of Conservation Units and populations. Action steps 5.2–5.4 require, in turn, planning and implementing annual fisheries, habitat management activities, and enhancement activities.³⁷⁸

DFO and non-governmental witnesses suggested that aspects of Strategy 5 could be implemented now, even though strategies 1–4 are not yet fully implemented. Mr. Young suggested that DFO could create and report to the public on an "annual plan," which stakeholders could rely on and evaluate, even before completion of strategies 1–4. Mr. Saunders said that, as DFO made progress on strategies 1–3, it would be possible to start implementing some aspects of Strategy 5. Moreover, as Mr. Ryall testified, DFO clearly does have work under way to plan and conduct annual fisheries as anticipated by Action Step 5.2.³⁷⁹

* Mr. Ryall noted that, in 2008, DFO hired a contractor to provide an economic analysis of Skeena salmon fisheries (Transcript, June 3, 2011, pp. 13–14). See also Exhibit 949, a report by Counterpoint Consulting entitled *Economic Dimensions of Skeena Watershed Salmon Fisheries*.

Strategy 6: Performance review

Strategy 6 of the Wild Salmon Policy mandates performance review, to determine what is and what is not working so as to encourage continuous improvement over time.³⁸⁰ Under Strategy 6, there are two levels of evaluation: annual review and a five-year independent review.

Action Step 6.1 commits DFO, in consultation with First Nations and others, to conduct annual post-season reviews of work-plan implementation for stock assessment, fishing, habitat, and enhancement.³⁸¹ Given my findings that DFO has not, to date, created any integrated strategic plan under Strategy 4 or implemented such a strategic plan through annual operational planning under Strategy 5, the department has not yet had the opportunity to implement Action Step 6.1.

Action Step 6.2 requires an independent review of the success of the WSP in achieving its broad goals and objectives within five years of its adoption.³⁸² As noted above, the last-minute addition of this requirement played an important role in providing assurance that DFO was committed to implementing the policy. However, by June 2010, DFO had not ensured that an independent review had commenced, let alone been conducted.

On April 14, 2011, following a series of internal meetings and consultations from 2009 to 2011, DFO staff sought direction from the Operations Committee on its proposed evaluation framework for the review.³⁸³ Shortly thereafter, DFO issued a Statement of Work with set terms of reference for the review and hired a contractor (Gardner Pinfold) to perform it.³⁸⁴ The final report of the independent review, *Performance Review of the Wild Salmon Policy*, was released in September 2011 and marked as an exhibit in this Inquiry.³⁸⁵

Gardner Pinfold relied in large part on the testimony and evidence called in this Inquiry. Perhaps unsurprisingly, their conclusions on the WSP are generally consistent with the observations I make in this Report.

Findings

I am not satisfied that the annual Wild Salmon Policy (WSP) work plans approved by the Operations Committee meet the requirement for post-season reviews under Action Step 6.1 developed in

consultation with First Nations and other stakeholders. When the Operations Committee approves annual WSP work plans, it simultaneously reviews the progress made on the previous fiscal year's work plan. These are strictly internal documents created to guide the work of Department of Fisheries and Oceans (DFO) staff in different sectors. First Nations and others are not involved in any review of DFO's internal work plans. Further, these WSP work plans do not set out any operational, on-the-ground activities or targets, such as the rehabilitation of specific habitats or setting fisheries exploitation rates, nor does the annual review of those work plans involve any review of whether operational targets were achieved.³⁸⁶

■ Consultation and partnerships in the implementation of the WSP

Consultation on policy implementation

I heard evidence on the extent of consultation DFO has engaged in with external partners, First Nations and stakeholders in the implementation of the Wild Salmon Policy. Ms. Farlinger referred to existing fishery management consultation processes and sporadic meetings on particular topics.³⁸⁷ Mr. Saunders advised that the last large forum held with First Nations or stakeholders on WSP implementation occurred in March 2008.³⁸⁸ A WSP forum in the fall of 2009 did not take place as planned.³⁸⁹

Mr. Ryall produced for this Inquiry a Meeting Inventory Description and a spreadsheet entitled "Inventory of Meetings Related to Fraser Sockeye Planning and WSP Implementation" (together, meeting inventory).³⁹⁰ The purpose was "to compile an inventory of meetings (bilateral and multi-interest) related to Fraser River sockeye planning, WSP implementation, and other integrated planning processes" from June 2005 to March 2011, where discussions likely referred to or were relevant to WSP implementation.³⁹¹ The inventory includes information about meetings organized by DFO, as well as meetings where DFO employees were simply invited to participate or attend, and internal DFO meetings that excluded First Nations and stakeholders.³⁹²

Only a small subset of the listed meetings falls into the category of “WSP Implementation.” Other categories include IHPC meetings, sector-specific engagement meetings, various multi-interest engagement meetings, and CSAP peer-review meetings.³⁹³ Even within the category of meetings labelled “WSP Implementation,” many of the meetings relate to FRSSI or the Skeena Watershed Initiative, and not all these meetings were focused on WSP implementation.³⁹⁴

Neil Todd, operations manager for the Fraser River Aboriginal Fisheries Secretariat (FRAFS), attended the second day of a FRAFS workshop on October 14, 2010. To his knowledge, and contrary to the page in the meeting inventory that lists meetings between DFO and the FRAFS, WSP implementation was not discussed in any substantive way at that workshop and was not on the agenda.³⁹⁵ Mr. Shepert was likewise referred by counsel to a page in the meeting inventory listing meetings with the Upper Fraser Fisheries Conservation Alliance (UFFCA). Contrary to the meeting inventory, he testified that DFO had not had any substantive discussions with the UFFCA on WSP implementation.³⁹⁶

Since 2005, three meetings between DFO and British Columbia have touched on the WSP. Only one of these meetings is stated in the meeting inventory to relate to WSP implementation. The other two meetings are annotated as “updates” by DFO staff.³⁹⁷ With regard to one of the two updates, a meeting on October 23, 2009, Mr. Ryall clarified that DFO was “providing an update” to provincial staff on the department’s WSP implementation efforts and that it was not a “working meeting.”³⁹⁸ The Barkley Sound WSP pilot appears to be an exception because it features engagement with the province facilitated through two non-governmental organizations.³⁹⁹

Findings

Based on witnesses’ testimony and the meeting inventory, I find that many of the meetings listed in the meeting inventory prepared by the Department of Fisheries and Oceans (DFO) did not specifically or substantively address Wild Salmon Policy implementation. Rather, I view the inventory as a list of various meetings held or attended by DFO related to Pacific salmon fisheries and conservation generally. I am unable to put any significant weight

on this document as a record of DFO consultation on the implementation of the WSP.

Partnerships

I received no evidence of formal agreements between DFO and any of its potential partners – the Province of British Columbia or First Nations governments or stakeholders – governing the implementation of the Wild Salmon Policy. Nor is there any evidence of an overarching DFO strategy or plan aimed at involving First Nations, other governments, and stakeholders in WSP implementation.

I asked Ms. Farlinger if it was realistic for DFO to share its program responsibilities with its partners. She said she thought that the collaboration objective was still realistic. She believed that there had been significant advances, noting the Barkley Sound pilot and the Integrated Salmon Dialogue Forum. She also thought that DFO has made significant progress, in the last five years, in talking about Fraser River sockeye with First Nations.⁴⁰⁰

“[T]here are many people out in British Columbia that are involved in community groups, for example, that could assist the Department in collecting habitat data, or identifying habitat issues,” according to Dr. Riddell. He added that DFO staff “knew we had to be more involved with the Province because they have much of the terrestrial habitat information that could be used.”⁴⁰¹ In Dr. Riddell’s words, while there was no question that DFO scientists have the scientific capacity, the scientists were directed to other activities beyond WSP implementation, such that DFO “can also use external help so that we reach completion within a reasonable timeframe.”⁴⁰² He said that, with the progress on implementation to date, DFO might now be more willing to start working with external groups to conduct the technical analyses and to implement monitoring on the ground. However, he noted that the need remained for DFO oversight, to ensure the use of standardized monitoring approaches and maintain its “overall management responsibility.”⁴⁰³

Dr. Riddell referred to the Skeena Watershed Initiative, which has WSP implementation as its primary objective. The initiative seems to be driven by external parties, with DFO as a partner rather than

taking the lead. It gives DFO technical assistance on defining CU benchmarks and working on habitat issues, and it is piloting Strategy 4 watershed planning (the Skeena Watershed Initiative is also discussed below in the section on Strategy 4 implementation).⁴⁰⁴ For this governance effort, the Pacific Salmon Foundation had sought the involvement of a wide selection of stakeholders and all user groups, and attempted to have an open, transparent process.* However, Dr. Riddell said that there “have been issues ... in terms of who is allowed to be represented” in the watershed governance process, conceding that “we’re having growing pains in terms of full active involvement” with participants. He described it as an advisory process, with recommendations going to DFO.⁴⁰⁵

Mr. Young said that some opportunities under strategies 1 and 2, and perhaps Strategy 3, to redirect monitoring effort both within and without the department had probably not been fully explored. He emphasized that monitoring “is one of the key potential capacity constraints within the Department.” Like Dr. Riddell, he noted that, even if it secured assistance from external partners, DFO would still have to play a key coordinating role.⁴⁰⁶

Mr. Sprout emphasized that DFO could not conserve wild Pacific salmon on its own, without involvement of the province, First Nations, and stakeholders. He said that integrated strategic planning was not the responsibility of DFO or federal agencies; rather, “[W]e need to create watershed processes that are led by those agencies who have responsibility and the legal responsibility for management of water and the use of land, and ... those watershed processes need to look at planning human development.”⁴⁰⁷ Mr. Sprout stated that “the federal policies don’t get at those issues.” I note that this statement is difficult to reconcile with the express language of the Wild Salmon Policy, which speaks of the important but supporting role of other levels of government: “[T]here will need to be a high degree of support and involvement of Provincial, Territorial and local government at both local and region-wide levels of the structure ... This will require strong efforts by the Department and others to build the necessary political will and commitment for these

other levels of government to support and participate in the planning process.”⁴⁰⁸

In addition, Mr. Sprout noted that the province and regional districts would have to decide whether they would lead integrated strategic planning processes to address threats to Pacific salmon, such as climate change and various habitat impacts, and that the federal government “can only be a participant in those processes; it’s not going to be able to lead.”⁴⁰⁹ Mr. Ryall and Mr. Saunders agreed that DFO holds some, but not all of the policy or management “levers” over water or other aspects of fish habitat.⁴¹⁰ Mr. Sprout stated that others with “jurisdictional responsibilities” should lead watershed-based planning processes. He went on to say that any recommendations that I make on integrated planning for salmon conservation “will have to be looked at by parties who are not federal,” because this activity would involve matters outside DFO jurisdiction.⁴¹¹ Again, this proposition does not square with the clear levers over fish and fish habitat found in sections 35 and 36 of the *Fisheries Act*. Although the overlapping jurisdiction of the province may make the department’s habitat work more challenging, DFO does hold levers and is directed to take a lead role in integrated planning through Strategy 4 of the Wild Salmon Policy.[†]

Partnerships with the province

Dr. Riddell recalled that DFO gave the province two briefings before the public consultations on the draft Wild Salmon Policy but that the department did not invite the province’s direct involvement in drafting the policy. In his view, it was more important for the province to be involved in implementing the Wild Salmon Policy – particularly strategies 2, 3, and 4 – than to be actively involved in developing it.⁴¹² Although a senior provincial official expressed concerns to Mr. Sprout in late 2003 or 2004 that a wild salmon policy might have significant implications for how fisheries are conducted, the province endorsed the policy when it was approved in June 2005.⁴¹³ Mr. Sprout and Ms. Farlinger said that, after 2005, they had not heard of any reservations or concerns held by the province with respect to the policy.⁴¹⁴

* For a description of the Pacific Salmon Foundation, see PPR 11, *Habitat Enhancement and Restoration*, p. 51.

† Bill C-38, *An Act to implement certain provisions of the budget tabled in Parliament on March 29, 2012 and other measures*, received royal assent on June 29, 2012. As discussed further in Volume 3, Chapter 3, *Legislative amendments*, Bill C-38 contains a new section of the *Fisheries Act* which allows the minister to enter into agreements, arrangements, or transactions with a variety of entities for the purposes of the Act.

In a 2006 letter on WSP implementation, the Pacific Fisheries Resource Conservation Council (PFRCC) encouraged DFO to enter formal agreements with the province for data access and sharing. Minister Loyola Hearn responded, “DFO staff in the Pacific Region are currently working with provincial colleagues to share data and are working toward the creation of a formal agreement to cover this ongoing activity.”⁴¹⁵

Ms. Farlinger did not mention any joint or collaborative activities aimed at WSP habitat monitoring or integrated watershed planning. She did, however, note the existence of various non-WSP agreements with the province, the sharing of data, oceans planning activities, operational fisheries planning activities, and the *Riparian Areas Regulation*.⁴¹⁶

Mr. Sprout also gave examples of federal-provincial co-operation in “various other organizational arrangements” outside of the context of WSP implementation. He discussed a few “leadership initiatives” – the Integrated Salmon Dialogue Forum and the Fraser River Salmon and Watersheds Program (FSWP).^{*} The FSWP was given \$10 million by DFO, half of which was in-kind support and the other half new funds obtained through a Treasury Board submission. The FSWP funds are not administered by DFO: rather, DFO granted these funds to the Pacific Salmon Foundation and the Fraser Basin Council, non-profit groups, to administer and fund various projects related to salmon conservation which were proposed by stewardship groups and First Nations.⁴¹⁷ However, I heard no evidence that these programs were ever specifically tasked with implementing any WSP strategies or action steps.

Mr. Ryall said that there were discussions between DFO senior management and the province “around a host of activities, and one of those being Wild Salmon Policy” and “various ways of interacting with the Province on ... implementation,” although no specifics were provided.⁴¹⁸ Mr. Saunders could not provide any details on engagement with the province on WSP implementation but noted some “working level” engagements between DFO and provincial scientists. He suggested that a key area for partnership, and a focal point for integration, was the FSWP.⁴¹⁹

Mr. Saunders testified that the need for collaboration was “a big subject under Strategy 4,” one that

requires DFO to do more to establish a governance mechanism to allow four orders of government to work together.⁴²⁰ Dr. Hyatt said that, although working-level engagements had value in advancing WSP objectives, they fell “far short of the broad scale integration of effort envisaged under various sections of the WSP,” such as Action Step 4.2 (integrated strategic planning). Better linkages were needed to overcome the currently fragmented state of information and data systems, held by a variety of federal and provincial agencies, of relevance to WSP implementation.⁴²¹

Dr. Hyatt emphasized that DFO should pursue collaboration on the Wild Salmon Policy with the province. He recommended that Canada and British Columbia negotiate a formal bilateral agreement, or set of agreements, to actively collaborate on WSP implementation. In his view, “without that kind of joint action, Wild Salmon Policy ... will face insurmountable difficulties.”⁴²²

Mr. Sprout said that, over time, the province’s capacity to participate in initiatives related to WSP implementation, such as watershed planning processes, had diminished. His staff advised him that, while the province had previously co-operated and shared workload on habitat conservation activities, increasingly it lacked the resources or capacity to contribute.⁴²³ Mr. Sprout added that, notwithstanding the province’s capacity issues, he believed that, generally, DFO and British Columbia worked relatively well together.⁴²⁴

Partnerships with First Nations

Although all four guiding principles under the Wild Salmon Policy are relevant to First Nations, Principle 2 is specific to them. It requires that Canada’s resource management processes and decisions honour Canada’s obligations to First Nations.

Correspondence in evidence shows that Fraser River First Nations sought to have DFO identify WSP implementation opportunities for First Nations, including tasks that First Nations could carry out on the ground and leadership roles.⁴²⁵ Mr. Saunders said that there are different levels of understanding on WSP technical issues within First Nations communities, and DFO needs to consider how to engage with First Nations at a local community level. He said he understood from First Nations that it was important

* For a full description of the FSWP, see PPR 11, Habitat Enhancement and Restoration, pp. 53–54.

to them to stay involved in the implementation of the policy. Mr. Saunders agreed that clearly articulated Tier 1, 2, and 3 processes* would be helpful in the implementation of the policy.⁴²⁶

Mr. Shepert testified that First Nations had broadly supported the WSP in its development and liked it “in concept.” Overall, in his view, DFO’s lack of engagement with First Nations in WSP implementation was very concerning.⁴²⁷

The third “guiding principle” of the Wild Salmon Policy states that resource management decisions will reflect best science, including Aboriginal traditional knowledge (ATK).⁴²⁸ The policy provides that the delineation of Conservation Units will include ATK, and that detailed reports on priority CUs will consider and incorporate ATK, where available.⁴²⁹ In meetings with First Nations from 2005 to 2007, DFO sought input on how DFO should identify and include ATK in identifying CUs, characterizing habitat, and developing ecosystem indicators.⁴³⁰ In 2006, DFO developed a proposal with the BC Aboriginal Fisheries Commission for guidelines concerning the use of ATK in fisheries management in the Pacific Region. However, Mr. Saunders said that, after that organization disbanded, “we just never had a good opportunity to put that proposal back on the table again.”⁴³¹

After Mr. Saunders left the WSP coordinator position in March 2007, DFO’s interest in this issue appears to have waned. First Nations continued to raise the need for incorporating ATK into WSP implementation, including at a WSP Forum in March 2008.⁴³² The WSP Implementation Team did not reach a decision on this issue in 2008 or 2009. On December 15, 2009, the team decided to refer the issue to regional management.⁴³³

In 2010, the Strategic Directions Committee rejected the idea of a WSP-specific approach to ATK. While acknowledging that ATK is specific to particular circumstances, the committee relied on the existence of less salmon-specific guidance materials, suggesting that the guidelines of the *Species at Risk Act* could be “more broadly applicable to determining ATK.”⁴³⁴ In reporting back to the WSP Implementation Team, Lisa Wilson, the current WSP coordinator, advised that there was no support from regional management for a WSP-specific project on how to include ATK in WSP implementation.⁴³⁵

■ Funding for WSP implementation

Earlier in this chapter, I discussed DFO’s failure to create a WSP implementation plan, or even to estimate the cost of implementation. Below I turn to the issue of the funding that was provided for the implementation of the Wild Salmon Policy. The WSP addresses resource issues for implementation:

First, implementation must be accomplished within DFO’s existing resource capability and will be phased in over time.

...

Full implementation will not be achieved overnight. Establishing the management and consultation process, and allowing it to mature, will take time. The completion of scientific work to define Conservation Units, establish benchmarks, and design new assessment systems will depend on the availability of data and scientific capacity. In addition, the policy introduces new challenges for the conduct of ongoing programs, and ultimate success depends on effective delivery of the Department’s research, enforcement, and Aboriginal programs. *All of these activities, ongoing and new, must be accomplished within the envelope of available funding.* [Emphasis added.]⁴³⁶

Mr. Chamut testified that, when he was asked to take on the WSP development role in the region, “there was never any discussion about the cost of implementing the Wild Salmon Policy.” To the contrary, he stated that the minister “was not given any suggestion that it was going to take a large investment of money and, in fact, quite the reverse; it was expected the policy would be implemented with existing funds.”⁴³⁷

Similarly, in a November 24, 2004, email, Dr. Richards wrote: “I recognize that we will be under pressure to proceed at a rate faster than current resources permit. I think we should push back and try to do this within existing resources.”⁴³⁸ Mary Hobbs, regional director, Policy, replied to Dr. Richards’s email:

* For an explanation of Tier 1, 2, and 3 processes, please see Chapter 5, Sockeye fishery management, in the sections on DFO advisory processes and on Aboriginal fishing policies and programs.

While the policy itself is designed to be implemented within the existing resource capability of regional programs, it requires a change in the way business is carried out. Because of this there are a number of specific start up costs associated with implementing the policy. These fall into three broad areas and include: integration, consultation and discrete work required to launch the WSP. To integrate habitat, watershed and fish production decision making requires an internal and external cultural shift in thinking, planning and managing. Support is needed to jump start the cultural shift. Support is also needed to build processes and begin to deliver capacity building skills internally and externally. Consultation will be required for key pieces of work that underpin operational implementation – e.g. conservation units, social and economic framework. Discrete pieces of work include documenting key habitats for salmon species, developing indicators and benchmarks for habitat quantity and quality; developing indicators to monitor freshwater ecosystems; biological risk assessment of enhanced fish on wild salmon are required.⁴³⁹

Dr. Irvine agreed it was a “challenging situation” to be asked to implement a new policy relying on existing funds.⁴⁴⁰

Although the policy stated it was to be implemented with existing funds, Mr. Chamut confirmed that, at the beginning of June 2005, he was involved in trying to cobble together some WSP implementation money from various sources in DFO, so the funds could be announced by the minister later in June.⁴⁴¹ His email of June 1, 2005, says, “I think the

key to getting the Policy adopted will be to secure some money to attach to implementation.”⁴⁴² He contacted colleagues in Ottawa to “get them to provide money from their internal budgets, which I was able to do.”⁴⁴³ This amount included new funds to be provided from the operational relief submission, as well as small contributions from each sector.⁴⁴⁴

Mr. Bevan acknowledged that DFO did provide “seed money” to start implementation. He said that the policy was “overly ambitious and unrealistic” to require certain scientific work under Strategy 1 without additional funds – in particular, its requirement “to identify all of the CUs and to set down limit reference points and other specific targets ... to help inform management.”⁴⁴⁵

The June 24, 2005, news release announced DFO’s adoption of the Wild Salmon Policy, and Minister Regan committed \$1.1 million in funding “for its implementation and related salmon science.” It confirmed that \$400,000 of the \$1.1 million was derived from new funds that the minister had announced the week before.⁴⁴⁶

DFO did assign some new, incremental funds to WSP implementation. These funds flowed through the Departmental Management Committee to the assistant deputy ministers to the Pacific Region. Mr. Sprout confirmed that these funds were modest and had eroded in the years since 2005.⁴⁴⁷ Ultimately, DFO allocated \$700,000 of this funding for WSP implementation, and the remainder went to salmon science related to the 2005 Williams Report on Fraser River sockeye.⁴⁴⁸ The 2011 Performance Review by Gardner Pinfold (Gardner Pinfold 2011) includes the annual budgets for WSP from 2005–6 to 2010–11. It is set out here as Table 1.10.3.

Table 1.10.3 WSP annual budgets (in thousands of dollars)

Year	Science	Fish management	Habitat	Policy	Total	Full-time equivalent
2005–6	400	200	100	0	700	
2006–7	400	200	100	0	700	
2007–8	310	200	284	70	864	
2008–9	300	240	329	55	924	7
2009–10	245	200	28	55	528	7
2010–11	222	295	38	0	555	13

Source: Reproduced from Exhibit 1992A, p. 20.

The numbers in Gardner Pinfold 2011, as set out in Table 1.10.3, are reliable, based on the whole of the evidence I received, except that the evidence for 2010–11 was presented as a range, and the numbers in Table 1.10.3 are the upper limit of that range.

In testimony, Ms. Dansereau did not agree with a suggestion put to her that DFO lacks sufficient money to implement the WSP, saying, “I’ve said many times that I think we are adequately funded to do our work.” However, she immediately qualified this answer in two ways. First, her view appeared to be that DFO was adequately funded to continue WSP implementation at its current pace: “I think, given the resources that we have, the implementation is moving to the best of our ability.” Second, she said more money could be helpful.⁴⁴⁹

Ms. Dansereau confirmed that the WSP had not been discussed by the Departmental Management Committee (DMC) or its successor (for a brief explanation of the DMC, see Chapter 4, DFO overview). She said that, as a national policy implemented in the Pacific Region, issues related to its implementation would be considered by regional management.⁴⁵⁰ Ms. Dansereau and Mr. Bevan also confirmed that the policy had not been considered by senior management at the national level since being approved in 2005.⁴⁵¹

Ms. Farlinger indicated that “any change in how DFO does business requires the injection of new financial resources,”⁴⁵² including the possibility of reallocation or reassignment of existing resources.⁴⁵³ In her view, it was still possible for DFO to implement the policy within existing resources, giving as an example the fact that DFO “relies on the WSP in making difficult harvest management decisions.”⁴⁵⁴ Ms. Farlinger testified that regional management attempted – when staff had the choice – to make resources available for WSP implementation.⁴⁵⁵

Mr. Saunders acknowledged that the requirement to implement within existing resources has dictated the pace of WSP implementation and prejudiced its expeditious implementation.⁴⁵⁶

Mr. Sprout offered two recommendations aimed at ensuring sufficient WSP funding. First, he urged against any further reduction to the department’s stock assessment capacity. Second, he recommended that new resources be directed toward OHEB to advance WSP implementation.⁴⁵⁷

On June 17, 2010, DFO staff briefed the Operations Committee on the resource challenges

faced in implementing the Wild Salmon Policy.

One stated challenge was that “WSP is a regional priority that has limited influence in budgeting / priority setting exercises undertaken nationally.”⁴⁵⁸

Ms. Farlinger did not agree or disagree with this statement, saying it “could be debated.” The other resource challenges identified by staff were that “[r]esources to leverage and capitalize on collaborative opportunities are limited”; “[t]he foundational science elements of the WSP strategies require a significant investment of resources from within existing budgets”; and “[p]riority CUs have not been identified.” Ms. Farlinger explained that regional directors worked with their national colleagues to put together program budgets, which included funds for WSP implementation. She said that it is the job of the regional directors to fight for a budget based on regional priorities for their section, which may have limited influence nationally.⁴⁵⁹

Currently, annual funds targeted to WSP implementation are provided ad hoc for the short term. WSP funding, in a given fiscal year, is pulled together only after that fiscal year has already commenced. Funds are requested and allocated following the annual WSP work plan and budget proposal, typically in a decision made by the Operations Committee in the late spring or early summer.⁴⁶⁰ Mr. Sprout testified that the Pacific Region has received annual WSP funds that are incremental to its regular budget, but this funding has decreased over time.⁴⁶¹ Other evidence suggests that WSP funds are largely pieced together annually from contributions from the branches within the region. These contributions are reallocated from existing budgets, primarily by the Science and FAM branches.⁴⁶² In the first years of WSP implementation, OHEB also made contributions, but they dwindled notably after 2008.⁴⁶³

WSP implementation does not currently follow DFO’s activity-based accounting system. Ms. Farlinger confirmed that WSP implementation does not fall within DFO’s normal Program Activity Architecture, described in Chapter 4, DFO overview, from which DFO’s programs and program budgets flow.⁴⁶⁴ Instead, WSP funding comes from different individual programs – provided that the branches are willing to contribute. Mr. Saunders testified that DFO does not provide any targeted funding for WSP consultation. If DFO wished to hold a WSP forum, for instance, the branches would

have to reallocate resources from existing budgets.⁴⁶⁵ Ms. Dansereau said that if WSP implementation requirements were part of a DFO program, they would attract “targeted money.” She added that this approach would be a different way to manage implementation.⁴⁶⁶

Obviously, the ad hoc nature of WSP funding makes the implementation of the policy’s obligations less certain and stable than for normal, budgeted program activities. In hearings in June 2011, despite being well into the year, Mr. Saunders could not advise me of the amount budgeted for WSP implementation in the 2011/12 fiscal year because of uncertainty surrounding the federal budget. Nor could he estimate the funds that may be allocated in coming years.⁴⁶⁷

This funding uncertainty has sometimes resulted in DFO’s failure to implement WSP action steps. In October 2008, for example, the Operations Committee rejected OHEB’s request that other regional branches provide three years of funding to populate and maintain the WSP web-mapping application Habitat staff had developed in partial fulfillment of the Action Step 2.4 requirement to develop an integrated data system for watershed management.⁴⁶⁸

Several DFO scientists recommended more dedicated financial support for WSP implementation.⁴⁶⁹ However, with the exception of information from the Strategy 2 costing exercise by Habitat staff, I did not receive any estimate from DFO of the funds needed to ensure WSP implementation.*

I received several ballpark estimates from non-governmental witnesses, including a former DFO Science manager, of what it might cost to implement the policy over the next few years. The financial estimates provided by Dr. Riddell and Mr. Young were based on previous reviews of the adequacy of DFO’s funding for WSP implementation as well as on recent conversations. Like DFO witnesses, they connected the slow pace of WSP implementation in part with funding limitations. As I discuss below, both witnesses distinguished between a short-term funding infusion for foundational or “core” WSP implementation, which they estimated at between \$2.5 million and \$3 million per year, and long-term funds to support the

ongoing assessment and monitoring of CU status, habitat, and ecosystems.

Mr. Young testified that the David Suzuki Foundation initially understood that DFO would provide at least two, if not three, years of funding at around \$1 million per year. Based on the implementation experience of those early years, the foundation assessed that the annual million “wasn’t sufficient on its own just to support the implementation function, the coordination function.” Rather, the foundation, through Mr. Young, recommended “a number closer to \$3 million a year.” Mr. Young added that such funding “would only be useful if it truly came with a mandate to apply and implement the Policy.”⁴⁷⁰

Dr. Riddell’s evidence on funding requirements was similar to Mr. Young’s. He testified that additional resources would be necessary for “a short, intense period of catch-up, so that we can actually really start evaluating how to implement the Policy and what conservation units require special attention.” In his view, approximately \$2.5 million per year was required, over a couple of focused years of WSP implementation, to prepare to implement the policy on the ground. He derived this \$2.5 million per year estimate from talking to people about what would be needed to pull together a concerted, short-term scientific effort to assist DFO in the technical implementation of strategies 1, 2, and 3, before DFO could move onto management and planning processes.⁴⁷¹ Dr. Riddell also agreed with Mr. Young that, in the long term, the policy’s commitments to monitoring habitat and taking account of ecosystem indicators, under strategies 2 and 3, would likely require additional funds on an ongoing basis.⁴⁷²

Some DFO witnesses acknowledged that long-term monitoring and assessment under the Wild Salmon Policy would be costly to implement.⁴⁷³ However, DFO managers tended to discount the costs of ongoing monitoring and assessment under strategies 1, 2, and 3. Mr. Saunders said that whether WSP implementation would become more expensive as DFO commenced monitoring and assessing CU status was a “very difficult question to answer,” and that it depended on whether DFO decided to seek “a full

* For some outcomes of the Strategy 2 costing exercise, see Exhibits 126, 127, 144, and 147. Also refer to my discussion of Strategy 2 implementation earlier in this chapter.

suite of information on absolutely every conservation unit." Implying that the degree to which CU assessment was necessary is not a function of the policy itself, he said that the extent and cost of assessment depended "on what advice is required to support fisheries management." Mr. Saunders conceded that DFO does not currently have the resources to assess the status of all CUs in the Fraser River watershed or to implement full monitoring of ecosystem status.⁴⁷⁴

Ms. Farlinger said that, as DFO moves toward full implementation and the policy is more operational, the direct costs of WSP implementation would decline. When it was suggested to her that this statement was wishful thinking, she replied that First Nations and others would assist DFO with WSP monitoring and would provide funding. However, she clarified that she was not saying that assessment and monitoring would not be expensive. Rather, she believed that the money would be found in different ways, either within existing DFO operational budgets or from partners.⁴⁷⁵

Dr. Riddell saw the possibility of some relief from funding challenges in partnership opportunities, saying he hoped that DFO would be willing to work with external groups to conduct the actual monitoring. He acknowledged that, without control over monitoring methods, this more "widely dispersed" approach could put WSP implementation at risk and, therefore, DFO would need to maintain management responsibility over external monitoring. In his view, non-governmental funding should be welcome for credible, short-term technical assessments or monitoring. However, he cautioned that government should continue to maintain reliable long-term stock assessment data and focus on "having a legacy of good quality data for assessment."⁴⁷⁶

In the context of funding WSP implementation, I also heard cautions against redirecting funding toward Fraser River sockeye and away from other existing programs, including stock assessment for other salmon species. With limited budgets, the priority given to Fraser River sockeye, particularly in the dominant cycle year, has had adverse consequences for the assessment of other salmon populations.⁴⁷⁷ Funding limitations on salmon assessment and monitoring are worse elsewhere in British Columbia than they are for Fraser River sockeye.⁴⁷⁸

In addition to funding challenges, I heard evidence from DFO's WSP Implementation Team that the Pacific Region suffers from a lack of adequate human resources to implement the WSP. Dr. Holt believed that a lack of human resources at DFO was the largest challenge to WSP implementation.⁴⁷⁹ To remedy this deficiency, she felt that "it would be advantageous to have resources to build capacity at DFO over the long-term, as opposed to just short-term money for an individual project here or there to do more of a quick-fix."⁴⁸⁰ Ms. Stalberg echoed this statement, saying that DFO needed to focus on "longer-term resourcing versus just a quick injection of funding."⁴⁸¹ Additional funding would support more people within DFO to deliver WSP implementation. Conversely, if the region was limited to existing resources, she was not sure there could be a change in the delivery of the policy.⁴⁸² Dr. Hyatt noted that, when staff transitioned to and from the WSP Implementation Team, implementation activities could languish: a lack of capacity, he said, and the staff's growing workloads meant that WSP implementation absorbed a lot of their time.⁴⁸³ Finally, Dr. Irvine noted the need for "additional scientific capacity, youthful capacity," within DFO, particularly on habitat and ecosystem work. He also strongly urged that, beyond capacity in the natural sciences, "the Department needs to have more capacity with regard to things like resource economics [and] evaluation of social alternatives," which is particularly important for Strategy 4.⁴⁸⁴

■ Wild Salmon Policy implementation and Marine Stewardship Council certification

Marine Stewardship Council certification

As explained to me, the Marine Stewardship Council (MSC) is an organization that evaluates and certifies fisheries as well managed and sustainable.⁴⁸⁵ The objective of the MSC is to promote sustainable fisheries through the use of eco-labelling on MSC-certified fish products in

the marketplace, with a view to encouraging consumer demand for fish products originating from certified sustainable fisheries. Entities interested in particular fisheries can seek an evaluation from an accredited certification body using the MSC Principles and Criteria for Sustainable Fishing. Successful assessment yields a certification that is valid for five years, with annual surveillance requirements.⁴⁸⁶

In 2001, the BC Salmon Marketing Council, on behalf of the commercial salmon industry and acting as the “client” group, submitted four BC sockeye fisheries to the MSC for assessment, including one targeting stocks returning to the Fraser River.⁴⁸⁷ The certification process was protracted, and in June 2010, the Canadian Pacific Sustainable Fisheries Society took over the role of client.⁴⁸⁸ DFO, as the fisheries regulator, worked closely with the assessment team during the certification process.⁴⁸⁹

By December 2004, DFO staff had linked the Wild Salmon Policy to efforts to seek MSC certification for BC salmon.⁴⁹⁰ In a memorandum dated May 27, 2005, seeking a decision adopting the Wild Salmon Policy, Minister Regan was advised that the policy was connected to MSC certification and that “[t]he absence of a WSP will retard progress in gaining Marine Stewardship Council certification for salmon, a key objective of the commercial fishing industry.”⁴⁹¹

I have examined the MSC certification process because it is a useful comparison with the progress made on implementation of the WSP generally. In addition, I wanted to address the relationship of reference points in the MSC process to WSP benchmarks.

In July 2010, the independent certifier Moody Marine Ltd. certified the four BC sockeye fisheries as sustainable. However, reflecting concerns expressed by stakeholders, certification was made conditional on DFO meeting numerous conditions within a five-year time frame.⁴⁹²

On December 21, 2009, DFO finalized its Action Plan to Address Conditions for Marine Stewardship Certification of British Columbia Sockeye Fisheries (Fraser River, Barkley Sound, Nass River, Skeena River) (DFO’s MSC Action Plan).⁴⁹³ DFO’s MSC Action Plan is the nexus between the MSC certification conditions and the Wild Salmon Policy.

DFO’s MSC Action Plan was developed by FAM. It was drafted by Mr. Ryall, with input from some DFO Stock Assessment and Science staff. It was not approved by the Regional Management Committee or the Operations Committee. Rather, it was approved by Ms. Farlinger as the regional director of FAM and by Mr. Sprout as the regional director general, before Mr. Ryall sent it to the certifier.⁴⁹⁴

There was no consultation with the WSP Implementation Team before Mr. Sprout approved DFO’s MSC Action Plan. As the manager of the SAFE Division of Science, Mr. Saunders viewed the document and gave some input on it during its preparation, and he approved aspects of it.⁴⁹⁵ Neither he nor Mr. Ryall, both members of the team in 2009, brought the draft or final MSC Action Plan to the team’s attention. In fact, none of the DFO Science staff who testified on WSP implementation had ever seen the document before their preparation for this Inquiry.⁴⁹⁶

MSC certification conditions related to WSP implementation

MSC certification is conditional on the implementation of aspects of strategies 1 and 4 of the WSP. For Fraser River sockeye, DFO’s MSC Action Plan sets out the specific WSP-related deliverables through which it would meet the MSC conditions, with the accountable DFO sector and timelines for each deliverable.⁴⁹⁷ It assumes that there will be no additional resources to implement DFO’s MSC Action Plan but indicates that the assumption may be re-evaluated if it proves flawed.⁴⁹⁸ When asked if DFO had looked at the assumption that existing resources are adequate, Ms. Farlinger testified that DFO was implementing its MSC Action Plan “within departmental resources at the moment.” She predicted that DFO would be able to fulfill those conditions over five years within departmental resources.⁴⁹⁹

The specific “Conditions Relating to Implementing DFO’s Wild Salmon Policy” for all four BC sockeye fisheries are set out in DFO’s MSC Action Plan.⁵⁰⁰ The key conditions that have deliverables expressly related to the policy are summarized in Table 1.10.4.

Table 1.10.4 MSC conditions relating to implementing the Wild Salmon Policy

<i>Condition</i>	<i>Sockeye unit</i>	<i>DFO deliverable</i>	<i>Accountable sector</i>	<i>Deadline</i>
General condition	All certified sockeye	WSP Strategy 1: PSARC paper defining CUs (Holtby and Ciruna 2008)	Science – Region	October 2008
General condition	All certified sockeye	WSP Strategy 1: PSARC paper with “reference points” methodology (Holt et al. 2009 and Holt 2009)	Science – Region	October 2009
General condition	All certified sockeye	WSP Strategy 4: Regional Framework for Integrated Planning	FAM – Region	December 2010
General condition	All certified sockeye	WSP Strategy 4: Report to Certifier on Integrated Planning	FAM – Region	December 2010
Condition 5 – define LRPs for Fraser River sockeye CUs	Fraser River sockeye	WSP Strategy 1: PSARC peer-reviewed paper defining Fraser River sockeye CU LRPs	Science – Area	December 2011
Condition 8 – meet LRPs for Fraser River sockeye target CUs	Fraser River sockeye	WSP Strategy 1: PSARC peer-reviewed paper defining Fraser River sockeye CU LRPs	Science – Area	December 2011
Condition 6 – define management units and TRPs	Fraser River sockeye	WSP Strategy 4: a revised IFMP	FAM, Science – Area	May 2012
Condition 19 – develop, implement recovery plans for CUs below their LRPs	Fraser River sockeye	WSP Strategy 4: a revised IFMP	FAM, Science – Area	May 2012

CU, Conservation Unit; FAM, Fisheries and Aquaculture Management; IFMP, Integrated Fisheries Management Plan; LRP, limit reference point; MSC, Marine Stewardship Council; PSARC, Pacific Scientific Advice Review Committee; TRP, target reference point; WSP, Wild Salmon Policy

Source: Compiled using data from Exhibit 159, pp. 2–3.

Although there were some subtle differences, the witnesses who testified about the MSC certification conditions generally agreed that it was useful and important that DFO had committed to specific timelines for meeting its WSP-related deliverables.⁵⁰¹ Mr. Ryall explained that DFO did so to create a work plan that was deliverable, with the workload staggered over five years. However, he also stated that “things

do change” and that “overall, to me it’s a guide, and our commitment is to meet these within those five years.”⁵⁰² As of September 2011, Ms. Farlinger expressed confidence that DFO could satisfy the MSC conditions for Fraser River sockeye over the five-year time period.⁵⁰³ Mr. Ryall said that DFO’s MSC Action Plan “was not intended as an implementation plan for the Wild Salmon Policy.”⁵⁰⁴

DFO’s MSC Action Plan treats WSP lower benchmarks as limit reference points

To maintain MSC certification for Fraser River sockeye, DFO must “fully implement” Strategy 1 – that means implementing all of Strategy 1 for all Fraser River sockeye CUs.⁵⁰⁵ DFO’s MSC Action Plan includes a table summarizing the DFO deliverables said to be specific to WSP Strategy 1 (Strategy 1 Table) – and is included here as Table 1.10.5.

In essence, the first three rows of the Strategy 1 Table break down Condition 5 of the MSC certification. Condition 5 provides: “Certification is conditional until the Conservation Units have been defined for Fraser sockeye using the methods described in Holtby and Ciruna (2007) and LRP’s [sic] for each Fraser sockeye conservation unit are defined and peer reviewed.”⁵⁰⁶ There is, however, a disconnect between the WSP use of upper and lower benchmarks and the MSC requirement that DFO establish target and limit reference points (LRPs).

Ms. Farlinger confirmed that Condition 5 required DFO to define limit reference points for each individual Fraser River sockeye CU.* She said that this use of LRPs in Condition 5 was equivalent to WSP lower benchmarks, although she understood that “there is a distinction because one is a trigger for a management action and one is a biological measure.” Ms. Farlinger agreed that “there probably is some debate about which is which.”⁵⁰⁷ In her testimony, she commonly referred to “limit reference points” and not to lower benchmarks.⁵⁰⁸

Target reference points (TRPs) and WSP upper benchmarks are also sometimes conflated in DFO’s MSC Action Plan, although the document is inconsistent in this respect. On the one hand, the Strategy 1 Table (Table 1.10.5) suggests that TRPs are to be determined not through science but through “participatory decision-making (co-management).”⁵⁰⁹ Under the policy, such participatory planning and management would commence under Strategy 4. On the other hand, DFO’s MSC Action Plan elsewhere states that, in defining LRPs and TRPs for non-target stocks (CUs) and

Table 1.10.5 DFO deliverables specific to WSP Strategy 1

Action	Description	Timeline
Identify Conservation Units	Paper defining conservation units regionally for all salmon species based on biological criteria (Holtby and Ciruna, 2007)	Paper reviewed and approved by PSARC, published 2008
Develop Standardized Assessment Criteria	Paper defining general methodology for determining reference points for salmon populations and assessment criteria (Holt et al, <i>in prep</i>)	Workshop, January 2009
	Workshop to facilitate application of methods in Holt et al.	Finalized methodology: October 2009
Define LRPs for each Target Stock (CU)	Apply criteria and methods of Holt et al (<i>in prep</i>) to specific CUs	Through December, 2011
Define TRPs for each Target Stock (CU) and corresponding harvest strategy	Recognizing TRPs inherently involve trade-offs, determine TRPs through participatory decision-making (co-management) – see below.	Through May, 2012

CU, Conservation Unit; LRP, limit reference point; PSARC, Pacific Scientific Advice Review Committee; TRP, target reference point

Source: Reproduced from Exhibit 159, p. 5.

* Without Ms. Farlinger’s clarification, DFO’s MSC Action Plan would appear internally inconsistent, as Condition 19 provides that certification is conditional until LRPs or their equivalents are defined for Fraser River sockeye salmon “stocks,” rather than CUs. See Exhibit 159, p. 6; Transcript, December 9, 2010, p. 75.

monitoring their status, DFO is implementing the WSP Strategy 1.⁵¹⁰

Mr. Bevan agreed that CU status benchmarks under the WSP must be incorporated into DFO fisheries management and decision making. He explained that this inclusion was the “basic element of the precautionary approach”: it requires DFO Science to “identify where the limit references are” under the Wild Salmon Policy, even though this work is complex and difficult.⁵¹¹

However, as I discuss above, before this Inquiry, members of the WSP Implementation Team did not agree with the characterization of WSP benchmarks as reference points. At that time, Dr. Irvine, Dr. Holt, and Dr. Hyatt had not been provided with a copy of DFO’s MSC Action Plan, either in draft or in final form. They had never been informed of the deliverables related to WSP implementation contained in it.⁵¹² Dr. Irvine was concerned that DFO’s MSC Action Plan equates WSP lower benchmarks with LRPs, and upper benchmarks with TRPs. He explained that “the drafter of the [MSC] Action Plan did not appear to understand the difference between WSP biological benchmarks and management reference points.”⁵¹³ Dr. Holt was likewise referred to the Strategy 1 Table, which expressly refers to her scientific work. The Strategy 1 Table (Table 1.10.5) states that, in order to “define LRPs for each Target Stock (CU),” DFO will “apply criteria and methods of Holt et al (*in prep*) to specific CUs” by December 2011.⁵¹⁴ Dr. Holt disagreed with this characterization of her work under Strategy 1 and said that her work has been on lower benchmarks, and not on limit reference points, as suggested in DFO’s MSC Action Plan.* Agreeing with Dr. Irvine, she testified that “this document confuses these two items, and they shouldn’t be confused.”⁵¹⁵

FAM fisheries manager Mr. Grout was also referred to the Strategy 1 Table. He confirmed that, to meet the condition, DFO is to “define LRPs,” but DFO was in the process in the Grant papers (Grant Draft 2010 and Grant Draft 2011, discussed

above) of defining WSP lower benchmarks for many Fraser River sockeye CUs. However, when asked about the MSC condition that DFO “define TRPs,” Mr. Grout said that the MSC requirements to define LRPs and TRPs “may or may not” refer to DFO’s work to define lower and upper WSP benchmarks for Fraser River sockeye CUs, and that they may instead refer to “the specific management reference points outlined by the Management Decision Rules.”⁵¹⁶

Dr. Riddell confirmed the tension in MSC certification regarding how to apply limit reference points, adopted under UN FAO (United Nations Food and Agriculture Organization) standards, to Pacific salmon. Dr. Riddell said that, as of June 2011, MSC was beginning to recognize the utility of applying a lower benchmark, which created more security for a stock, instead of “getting down to a limit reference point” where a stock was severely depressed and may not recover.[†] In his view, the MSC’s use of the precautionary approach in international fisheries instruments was the main challenge for Pacific salmon certification: “[T]he UN FAO description of a limit reference point is the key stumbling block.” Dr. Riddell said that the MSC was considering “the issue of how you are going to explain to UN FAO that the limit reference point that is being used at the certification for Pacific salmon is not the same as how they use it elsewhere.”⁵¹⁷

While DFO scientists and managers on the WSP Implementation Team do not have a common understanding of the management implications of WSP lower benchmarks, they all share the view that WSP benchmarks should not automatically be equated to reference points. Their view appears to conflict with the views of DFO senior management. This controversy is also evident in exhibits. DFO scientists raised their concerns with the “misrepresentation” of WSP benchmarks in DFO’s MSC Action Plan at the WSP team meeting on March 29, 2011.⁵¹⁸ They recommended that the language used in the department’s MSC documents be clarified to avoid confusion.

* Dr. Holt explained that “LRPs are generally more prescriptive than WSP benchmarks[,] which are not intended to direct a specific management action like a harvest control rule. Rather, lower benchmarks under the WSP are intended to reflect biological status.” See Exhibit 182, p. 1.

† Mr. Young testified that updates to the methodology used by the MSC are being considered, with the MSC now recognizing the need to protect biodiversity and discussing Canada’s Wild Salmon Policy as a model for that. See Transcript, June 1, 2011, pp. 83–84, 95–96.

DFO's Status Update on MSC certification conditions for the May 2011 audit

In May 2011, Mr. Ryall prepared, with staff input, a document entitled "Summary of Key MSC Certification Deliverables and Their Status for Sockeye" (DFO Status Update).⁵¹⁹ This document provides his opinion of the status of DFO's deliverables for meeting MSC certification conditions, indicates who in DFO is accountable, and states the timeline.⁵²⁰

According to the DFO Status Update, Mr. Saunders is accountable for delivering on MSC conditions 5 and 8, which require a WSP Status Assessment paper defining "limit reference points" for Fraser River sockeye CUs.* It is clearly a matter of controversy between FAM, on the one hand, and, on the other, DFO scientists working on WSP implementation whether it is appropriate to deem biologically determined benchmarks under WSP Strategy 1 to be equivalent to management reference points. Mr. Saunders worked directly with Mr. Ryall in preparing the DFO Status Update, and he asked Dr. Arlene Tompkins, head of Salmon Stock Assessment and chair of the Stock Assessment Coordinating Committee, to ensure that stock assessment area chiefs were consulted.⁵²¹ However, members of the WSP Implementation Team, including Dr. Irvine, Dr. Hyatt, and Dr. Holt, were not involved in preparing the DFO Status Update.⁵²²

The DFO Status Update characterizes the Grant paper as being about LRPs, despite the testimony of Dr. Holt, a co-author of the paper, that her work does not address LRPs.⁵²³ The DFO Status Update also references a pre-peer review May 2010 draft of Dr. Michael Bradford's publication on the Status of Cultus Lake Sockeye Salmon, despite the fact that, by May 2011, this draft paper had been published in a final, peer-reviewed version. Dr. Bradford, a DFO research scientist, was not informed that DFO was providing his paper in support of MSC certification.⁵²⁴

Findings

I agree with the testimony of Paul Ryall, former lead, Salmon Team, that the Department of Fisheries and Oceans' (DFO's) MSC Action Plan was not intended to be an implementation plan for the Wild Salmon Policy (WSP). The MSC Action Plan does not fully address Strategy 4, nor does it address strategies 2 or 3. Thus, while it is clear that DFO's MSC Action Plan contains key WSP deliverables and timelines, for Fraser River sockeye it is not exhaustive.

DFO's MSC Action Plan clearly demonstrates the feasibility and utility of the department adopting a long-term WSP implementation plan with timelines, as is expressly required by the Wild Salmon Policy.⁵²⁵ A plan would ensure that DFO implements the WSP strategies not addressed by Marine Stewardship Council (MSC) certification conditions.

Additionally, I view the confusion between benchmarks in the WSP and limit reference points (LRPs) in DFO's MSC Action Plan as having implications for how DFO will implement the WSP for Fraser River sockeye Conservation Units in the future. If WSP lower benchmarks identified by DFO scientists are to be treated as LRPs in order to meet MSC sustainability requirements, this treatment has implications for current escapement planning. Rather than allowing harvest planning to take place at Strategy 4, as intended by the WSP, the Strategy 1 benchmarks will effectively set the harvest decision point. That is contrary to the policy and may have the effect of requiring DFO to curtail fisheries at the point a stock enters the red zone without the benefit of the socio-economic and habitat impact analysis required in Strategy 4.

As previously noted, LRPs are set at a lower number than the more precautionary lower benchmarks under the WSP. If WSP lower benchmarks are treated as equivalent to LRPs, then, given the intentionally more precautionary nature of WSP lower benchmarks, the trigger to curtail fishing will be above the point when there is an immediate threat of extirpation.

* Exhibit 969, p. 1. Although Mr. Saunders is expressly made accountable for some deliverables for MSC certification in the DFO Status Update, his witness summary states that he is not directly involved in DFO's work on MSC certification, apart from being asked whether his staff at Science are able to meet the needs of DFO's Action Plan. See Exhibit 101, p. 5.

Finally, the development of the MSC Action Plan and, later, the DFO Status Update highlight a lack of integration and oversight in DFO's internal governance and administration of the Wild Salmon Policy. Fisheries and Aquaculture Management (FAM) officials submitted these two documents without input from those DFO scientists knowledgeable about and engaged in Strategy 1 implementation or from those DFO scientists whose ongoing work on WSP benchmark methodology and WSP status assessments is mentioned in the MSC Action Plan. FAM is not responsible for any Strategy 1 activities; to date, Science has been responsible for Strategy 1 implementation.

This situation also underlines the inadequacy of the current WSP governance model within DFO, as discussed below. In this instance, FAM made commitments on Strategy 1 implementation to the fishing industry and to MSC without consulting those responsible for Strategy 1 implementation.

■ DFO's governance approach to the Wild Salmon Policy

DFO acknowledged that the Wild Salmon Policy would likely require organizational changes. In 2005, the Williams Report on Fraser River sockeye recommended that DFO's Pacific Region reassess its core mandate with respect to Pacific salmon management "and devise a management or organizational structure that best supports that mandate."⁵²⁶ In its response to the Williams Report, DFO said:

In the longer term, changes related to new initiatives (e.g. Pacific Fisheries Reform, Wild Salmon Policy implementation) will likely require a review of organizational structures. Any changes related to these activities will have to consider the broad DFO mandate, including structure at both the national and regional levels.⁵²⁷

Since June 2005, however, DFO has not changed its accountability structures in relation to the policy.⁵²⁸

DFO's internal governance structure for WSP implementation

Mr. Sprout said that there was no one senior official in national headquarters with responsibility for WSP implementation. He said this responsibility was distributed across DFO's national sectors, including Science, Fisheries and Aquaculture Management, and Policy.⁵²⁹ He also said that it would have been a normal practice for him to advise the assistant deputy ministers of the Pacific Region's interest in advancing WSP implementation and to try to convince them to provide financial and moral support.⁵³⁰ He did not identify any formal mechanism whereby the region reports on WSP implementation, either to national headquarters or to Parliament.

According to Mr. Sprout, if the WSP is to be successfully implemented and become part of DFO's organizational culture, it must be supported by national headquarters, including at the ministerial level.⁵³¹ In describing accountability structures for the policy to me, Ms. Farlinger did not mention any national headquarters officials – the deputy minister, the assistant deputy minister, or any other top people.⁵³² Apart from the example of briefing a minister on a fishing plan, neither Ms. Farlinger nor Mr. Sprout mentioned interactions at a ministerial level regarding the policy, not even strategies 1–3.⁵³³

Mr. Sprout and Mr. Saunders confirmed that, regionally, DFO did not create a management committee specific to the Wild Salmon Policy. Rather, it formed the Strategic Initiatives Steering Committee, which became the Operations Committee, to deal with a number of "change initiatives," such as the WSP. This committee included the regional director general, the associate regional director general and the regional directors, and the area directors as appropriate, and it provided senior managers with a forum to consider WSP implementation. Mr. Sprout said this committee was intended to respond to the WSP Implementation Plan.⁵³⁴

Ms. Farlinger said the regional director general is kept informed on WSP implementation through briefings to the Operations Committee.⁵³⁵ A September 2010 briefing to the Operations Committee sets out that, since June 2005, overall direction and accountability rest with the regional

director general, supported by the Operations Committee and the Regional Management Committee.⁵³⁶

Dr. Irvine explained that there is an annual “standing meeting” between the WSP Implementation Team and the Operations Committee to develop the annual WSP work plan, and that, every six months or so, DFO staff make a presentation to the Operations Committee on various WSP implementation issues.⁵³⁷ There is, however, no formal mechanism for the Operations Committee to provide detailed direction to the WSP Implementation Team. Rather, the discussions and decisions of the Operations Committee are informally transmitted to the WSP Implementation Team by the team members who attend the meetings.⁵³⁸

The WSP Implementation Team

A WSP Implementation Team has continually been in place since the summer of 2005, its membership changing from time to time. As of 2011, it still had no approved terms of reference. Mr. Saunders testified that the WSP Implementation Team has always been led by the WSP coordinator, who is from the Policy Branch.⁵³⁹ Science, FAM, and OHEB typically have representatives, with the largest contingent coming from Science.

Ms. Farlinger’s September 2010 presentation to the Operations Committee also indicates that, under the accountability structure in place since June 2005, DFO regional directors have been responsible for aspects of WSP implementation as follows:

- Policy Branch for inter-branch coordination and reporting;
- Science Branch for strategies 1 and 3;
- Oceans, Habitat and Enhancement for Strategy 2;
- Fisheries and Aquaculture Management for Strategy 4; and
- all branches for strategies 5 and 6.⁵⁴⁰

Testifying in December 2010, Dr. Irvine said that, in the previous year, the WSP Implementation Team appears to have had “a lot more direction.”⁵⁴¹ Draft terms of reference for the team suggest that, by September 2010, DFO had designated a “lead” for each of strategies 1 through 4.⁵⁴² As Mr. Saunders

explained, because departmental funds flow through the sectors, the lead for each strategy was associated with the responsible DFO sector.⁵⁴³

By May 2011, the draft terms of reference had been revised and were attached to a presentation to the Operations Committee on May 26, 2011.⁵⁴⁴ The draft terms of reference briefly codify the roles and responsibilities of the WSP coordinator and Implementation Team, as well as the relationship between them and the Operations Committee. They confirm that the WSP Implementation Team “serves as the Region’s forum to facilitate regional achievement of the WSP goal, objectives, and strategies.” However, the team “is not a decision-making body.” Rather, it “promotes” the coordination, integration, and implementation of the policy.⁵⁴⁵

Mr. Saunders confirmed that individual WSP implementation projects were undertaken, with DFO officials assigned to lead them. However, there were no formalized teams for each project.⁵⁴⁶

The WSP coordinator does not appear to have a leadership role but, rather, is assigned primarily administrative and support tasks, such as organizing monthly team meetings, identifying opportunities for integration of WSP implementation into other activities, coordinating information management, and maintaining the WSP website. The WSP coordinator is not accountable for WSP implementation efforts but is responsible only for documenting these efforts. The individual “Strategy leads” are made responsible for implementing the tasks set out in the internal annual WSP staff work plans.⁵⁴⁷

Operational responsibility and accountability for WSP implementation

Mr. Chamut testified that WSP implementation has to come from the regional director general (RDG) as a priority.⁵⁴⁸ The deputy minister confirmed that the regional director general was the person responsible for WSP implementation, noting that this official is a “very senior person in the Department” who sits on the DMC and other national committees.⁵⁴⁹ In the context of WSP implementation, the associate deputy minister also pointed to the RDG as the person “who is actually accountable for getting the things done in the region.”⁵⁵⁰

Ms. Farlinger agreed that she was ultimately responsible for overseeing the operational side of policy implementation. She also confirmed that, at an operational level, it was her responsibility to ensure that the Pacific Region delivers programs consistently with DFO's policies.⁵⁵¹

Mr. Sprout said that the regional director general does not provide operational direction on WSP implementation. Asked if the RDG had specific obligations on WSP implementation, he described the role as one of giving high-level strategic direction:

I would describe the RDG's role as trying to provide strategic direction to those that would have more operational responsibility. And so strategic direction is things like trying to reconcile challenges, conflicts, grappling with budget, assigning responsibilities where ... the responsibilities are diffuse, where, for example, a number of the strategies are assigned to branches. But frankly to deliver the strategy, you need the branches to be working together cohesively. So I'm operating ... at probably the 30,000-foot level in terms of trying to provide the strategic direction.⁵⁵²

Mr. Sprout said that, when he was regional director general, he dealt with many officials about the policy, including the WSP coordinator and regional directors. He agreed that, in effect, all regional directors and all area directors held responsibilities for WSP implementation.* He said this governance structure was logical, noting that "the RDG isn't going to operationalize the Wild Salmon Policy."⁵⁵³ In December 2010, Ms. Farlinger confirmed that, in her tenure as regional director general, there had been no changes to the organizational structure described by Mr. Sprout, although she also noted that DFO's recent reorganizations at the national level required that the Pacific Region review and re-evaluate its regional management committees, and that the region therefore expected to make adjustments to those committees.⁵⁵⁴

The exact responsibilities held by the area directors for WSP implementation have not been identified in evidence. In this respect, I note

Mr. Saunders's evidence that many DFO employees have had little direct operational contact with the policy in the first five years of its implementation. Furthermore, DFO does not offer its staff training on the policy or its requirements.⁵⁵⁵ It appears that, since at least September 2010, area offices have had a representative on the WSP Implementation Team.⁵⁵⁶

There is conflicting evidence on the role and responsibilities of the Policy sector in relation to WSP implementation. Mr. Sprout suggested that the regional director of Policy had overall responsibility for WSP implementation, saying that the WSP coordinator reported to the regional director of Policy and that the regional director of Policy reported to the regional director general.⁵⁵⁷ Similarly, Mr. Saunders believed that the regional director of Policy "held overall responsibility" for WSP implementation.⁵⁵⁸ He said that "the responsibility for the implementation of the Wild Salmon Policy, as it gets linked back to senior management, is through the policy branch."⁵⁵⁹

Ms. Farlinger, in contrast, described the role of the regional director of Policy as that of a coordinator, not a leader. While the "Region uses the Policy sector to organize and coordinate WSP implementation," she said, the "Regional Directors have responsibilities over their sectors' assigned WSP tasks."⁵⁶⁰

The draft terms of reference for the WSP Implementation Team also mention the Policy Branch largely in the context of the role of the WSP coordinator, a position that Mr. Sprout agreed was relatively junior. The terms of reference state that the Policy Branch "chairs meetings and provides logistical and administrative support."⁵⁶¹ In 2010, the Operations Committee considered ending the Policy Branch's responsibility for WSP coordination, but did not do so.⁵⁶²

No operational program to deliver the Wild Salmon Policy

Although the Wild Salmon Policy expressly introduces a number of new program obligations, DFO has not created a program to deliver them.

The distinction between policies and programs within DFO is discussed in Chapter 4,

* Mr. Saunders also confirmed that, through the Operations Committee, each regional director was recognized as having responsibility for the components that his or her sector was implementing. See Transcript, December 2, 2010, p. 47.

DFO overview. Ms. Dansereau and Ms. Farlinger acknowledged that, if the Wild Salmon Policy were supported by a program, it would have a budget.⁵⁶³ Ms. Farlinger said that the WSP has been treated as a policy because its intention is to change how existing programs related to Pacific salmon are implemented.* However, she and Ms. Dansereau agreed that the WSP contains program components.⁵⁶⁴

Despite the fact that the Wild Salmon Policy includes many program components and the mechanism for an implementation plan to ensure that these program commitments are delivered, the former regional director general argued against creating a program to implement the policy. Mr. Sprout said that creating a WSP program may be counter-productive. He noted that WSP implementation requires a high degree of integration across a range of departmental activities and sectors and that the policy needs to be culturally embedded throughout the Pacific Region. Therefore, WSP implementation cannot be limited to one group or program. In Mr. Sprout's view, rather than create a program to implement the policy, it would be more pragmatic to "try to secure more incremental resources and have them committed and try to protect them."⁵⁶⁵

Gaps and overlaps in strategies 1, 2, and 3

With regard to strategies 1–3, although certain tasks clearly should be performed by individual branches within DFO, there still remains ambiguity, overlap, and gaps in the Pacific Region's accountability structures. I found Ms. Farlinger's evidence about which branches were responsible for which strategies confusing. In her September 2010 presentation to the Operations Committee, she states that the Science Branch is responsible for strategies 1 and 3, and OHEB for Strategy 2.⁵⁶⁶ However, her evidence summary, which she adopted in oral testimony, presents a more complex, overlapping accountability, indicating that Science is responsible for input into strategies 1, 2, and 3, and that OHEB has operational responsibility for Strategy 2 and parts of Strategy 3.⁵⁶⁷

Ms. Stalberg spoke about the need to better integrate strategies 2 and 3. She noted that Strategy 2

indicators were not completed and could not be completed without input from Science Branch, and that strategies 2 and 3 could not be integrated until the Strategy 3 indicators were undertaken and a monitoring framework created.⁵⁶⁸ Ms. Stalberg also said that OHEB stopped actively implementing Strategy 2 in 2009 because it was waiting for the Science Branch to catch up on Strategy 3.⁵⁶⁹

Mr. Sprout agreed that, for strategies 1–3, DFO needed co-operation and collaboration from all branches, rather than implementing the Wild Salmon Policy through institutional "silos." He recommended against DFO creating a program for implementation of strategies 1–3, as that could create a new silo.⁵⁷⁰

The need for stronger integration of strategies 2 and 3 is highlighted in the record. For example, in June 2009, DFO staff advised the Operations Committee that the Science Branch and OHEB were "co-leading revision of [a] methodology paper to determine habitat indicators." The Operations Committee was advised that "Science will participate with OHEB in the development of the Strategy 2 framework, with a focus on its interconnections to Strategy 3," and that this involvement "may include further refinements / revisions to the methodology paper."⁵⁷¹ However, when the department's WSP Habitat Indicators paper was published in late 2009, it was limited to freshwater and estuarine habitat indicators, with the marine habitat indicators to be produced by Science.⁵⁷² As of December 2010 when Ms. Stalberg testified, Science Branch had not produced marine habitat indicators.⁵⁷³ It appears that the necessary discussion and integration between Science and OHEB on habitat and ecosystem indicators for freshwater and marine environments has not occurred, at least not at the pace expected in 2009.

Leadership challenges in implementing Strategy 4

Strategy 4 directs DFO to move away from a traditional fisheries management approach toward a more integrated watershed planning approach. Despite this change, FAM was assigned responsibility for Strategy 4 and has made little progress on

* Mr. Saunders also explained that, within DFO, WSP implementation would not normally be referred to as a program, because a DFO program is "a specific collection of activities that are part of an ongoing responsibility." See Transcript, December 3, 2010, pp. 31–32.

implementing either interim recovery planning or long-term strategic planning.

As regional director general and the former regional director of FAM, Ms. Farlinger explained that FAM had been assigned responsibility for Strategy 4 because its decisions “have much to do with bringing together the factors in the first three [strategies] of the policy to make trade-offs, decisions, bring[ing] in economic and social impacts in terms of the recommendations that the Strategy 4 process would then provide to the minister.” She said that this kind of integration was the everyday work of FAM and that consultation is largely FAM’s business.⁵⁷⁴

In April 2011, the Strategic Directions Committee received a presentation and discussion paper on the implementation of Strategy 4, which advised that “a number of gaps and challenges have been identified related to progress under Strategy 4”⁵⁷⁵ including:

- DFO’s role in leading or supporting planning initiatives is not always clear.
- DFO lacks internal coordination in some cases.
- DFO lacks a clear governance structure for implementing Strategy 4.
- DFO lacks a strategic plan or operational guidance for Strategy 4.⁵⁷⁶

Mr. Ryall testified that the intent of the presentation was to generate discussion and obtain direction from the committee on a governance structure for integrated planning processes.⁵⁷⁷ However, the log of the April 14, 2011, meeting of the Strategic Directions Committee shows a decision to endorse the status quo: “Regarding internal coordination and integration of WSP and Strategy 4, it was agreed the Operations Committee will provide the guidance required from senior management as opposed to setting up a new system or committee.”⁵⁷⁸

Dr. Irvine said that, without direction, WSP implementation could become rudderless, particularly given the complexity of the task.⁵⁷⁹ He said DFO needs an integrated approach to WSP implementation, as in the Barkley Sound pilot.⁵⁸⁰ In contrast to “integration,” he used the word “sectorization” to describe the current approach to WSP implementation.⁵⁸¹ Dr. Irvine recommended that implementation

step process. I feel that we should be focussing on one particular action step and that’s Action Step 4.2. And Action Step 4.2 is basically the implementation of a fully integrated strategic planning process for salmon conservation ... we should be looking at it almost from a top-down [perspective], at least from a Strategy 4 perspective. And then to try to determine what scientific information is required, so a little bit less stove piping [between strategies and sectors].⁵⁸²

A David Suzuki Foundation report on Strategy 4 states that there “has been more outreach regarding the WSP to outside groups than within DFO, resulting in a lack of clarity within the Department about the WSP intent and content and how it will play out on the ground.”⁵⁸³ Mr. Young said that the information gathered about CU status under the Wild Salmon Policy is intended to inform DFO’s management decisions, but that WSP components had still not been integrated into habitat and fisheries management.⁵⁸⁴ Dr. Riddell added that, in a large bureaucracy, communication is a challenge; although there have been many efforts to distribute WSP information throughout DFO and to get people on side, there were still “some areas and some individuals who have not bought in fully.”⁵⁸⁵

Both internal and external assessments of DFO’s performance on WSP implementation have identified governance challenges related to integration. In its presentation to the Operations Committee regarding performance criteria for the Strategy 6 review, under the heading “Gap Analysis Findings: Key Challenges / Gaps,” the WSP Implementation Team identified governance challenges. They included the need for “[c]learly defined and agreed to accountability, roles and responsibilities for implementation,” and “[i]ntegration across programs (inconsistent implementation / stovepipes).”⁵⁸⁶

Responsibility for WSP implementation

On May 3, 2005, before the WSP’s approval by the minister, the Regional Management Committee (RMC) endorsed it and initiated the national approval process. The RMC Record of Meeting describes the following action to be taken: “[W]e need

become much more integrated and we should be going away from the action step by action

to identify a champion on the implementation side to ensure the WSP is coordinated and followed up on.”⁵⁸⁷ However, Mr. Saunders and Ms. Dansereau confirmed that no WSP “champion” was identified, although Ms. Dansereau described Ms. Farlinger as the “guardian” of the policy.⁵⁸⁸

Mr. Chamut pointed to the importance of leadership at the most senior level to ensure that the Wild Salmon Policy was implemented. He said that leadership on implementation should start at the top with the deputy minister, who needs to be “acutely aware” of the policy’s importance and ensure that people are accountable for its implementation.⁵⁸⁹

During the hearings, members of the WSP Implementation Team expressed frustration with the lack of oversight by senior management on WSP implementation. For example, Dr. Irvine identified a lack of leadership and direction from the regional director general and down the line of command as a “limiting factor” on WSP implementation. Although he had seen a significant improvement in 2010, which he credited to new people getting involved in the last year or so, leadership on WSP implementation in previous years was lacking.⁵⁹⁰ I note that this perceived lack of leadership and direction appears to be particularly acute for Strategy 3. For example, until October 2009, the Operations Committee had never received any presentation or provided direction to staff on the details of Strategy 3 implementation.⁵⁹¹

The deputy minister was asked if WSP implementation could be better advanced if DFO appointed a “czar of the Wild Salmon Policy.” Ms. Dansereau answered that, for her, “the verdict is not quite in” as to whether DFO requires a senior official to champion the policy.⁵⁹² Mr. Bevan said that the regional director general was the one “who is actually accountable for getting the things done in the region.”⁵⁹³

Mr. Chamut testified that the regional director general

needs to identify someone that is going to really be accountable for pulling all the various bits and pieces within the region together to make this happen, because sometimes there are barriers between sectors, between fish management, between science, between habitat, and I think you need someone that

sort of bridges all of those sectors to be able to lay down the priority and make sure that people are doing what they have agreed to do.

He said this would be a good role for an associate regional director general, and that this allocation of responsibility would emphasize that WSP implementation is a critical priority within the Pacific Region.⁵⁹⁴ In his view, the best way to ensure WSP implementation is to give a senior official the authority, responsibility, and resources to supervise a team of people doing the work.⁵⁹⁵

Mr. Sprout agreed that “if he had a more senior person who was working cooperatively with the other regional directors to try to advance as best as possible with the resources the implementation of the WSP ... I think that that would have merit.” He rejected the suggestion that the associate regional director general, who already has many responsibilities, should fill that position.⁵⁹⁶ I took his view to be that this role should be to coordinate rather than to direct implementation. Ms. Farlinger was also open minded to the possibility of having someone at a higher level engaged in improving integration and implementation.⁵⁹⁷

Dr. Irvine testified that, because WSP implementation is complicated, it was important that DFO have “a committed and passionate champion.” He said that, before 2010, senior leadership on WSP implementation was lacking.⁵⁹⁸ He recalled the leadership provided by Mr. Chamut in galvanizing DFO staff to complete the policy and in securing the support of senior officials.⁵⁹⁹

Notably, in emphasizing a need to move away from a “stovepiping” approach where individual sectors focused on individual strategies, Dr. Irvine felt that WSP governance would need to take more of a “top down” perspective if DFO was to move forward to implement integrated strategic planning under Strategy 4.⁶⁰⁰ This view conflicts with that of the regional directors general, who expressed caution about moving to an internal governance model where a senior official provides “top-down” direction – including, presumably, for integrated strategic planning.⁶⁰¹

The view that DFO needs a regional official or senior WSP champion to lead WSP implementation was also held by Ms. Stalberg, Mr. Saunders, and Dr. Hyatt.⁶⁰² Mr. Saunders specifically raised the issue of where such a champion should lie within

the department. He emphasized that, for WSP implementation, because responsibility is divided among branches, a champion should be at a higher level than regional director – at the level of the regional director general or the associate regional director general.⁶⁰³ Mr. Saunders was also receptive to the idea of having a facilitator to help the four orders of government work together, share technical information on the status of ecosystems, and engage in integrated planning.⁶⁰⁴

Mr. Young of the David Suzuki Foundation recommended stronger direction from higher levels within DFO and greater involvement from national headquarters on WSP implementation, with a firm connection between the region and national headquarters (NHQ) and direction from NHQ.⁶⁰⁵

In contrast, Dr. Riddell was less convinced of the need for a single WSP champion. He suggested that there should be a small, dedicated group of experts to drive WSP implementation forward.⁶⁰⁶ Mr. Young agreed with Dr. Riddell that a core group of experts was necessary, but he disagreed that it would be sufficient.⁶⁰⁷ Mr. Morley, for the commercial fishing sector, said that a lack of DFO leadership was holding back the integrated planning process.⁶⁰⁸

■ Findings

The Wild Salmon Policy (WSP) has been articulated as the means by which the Department of Fisheries and Oceans (DFO) will meet its obligation to protect and conserve wild salmon stocks on the Pacific coast. Susan Farlinger, regional director general, Pacific Region, described the WSP as “the expression of ... the precautionary approach” as applied to salmon.⁶⁰⁹ Every indication from the DFO witnesses who testified before me, and from ministerial statements in evidence before me, is that Canada is committed to the Wild Salmon Policy.

However, after seven years, DFO has not implemented the policy. It is being implemented at a much slower pace than DFO, First Nations, and stakeholders anticipated in 2005. The policy requires DFO to undertake some challenging new activities, particularly gathering new, Conservation Unit-specific information about biological status, habitats, and ecosystems and commencing new integrated planning processes. Some required WSP activities, such as habitat

assessment and monitoring, have not even been started.

DFO senior management witnesses maintain that DFO is complying with the spirit and intent of the policy. However, it is difficult to accept that there is compliance when the evidence is that critical biological assessment work remains incomplete, in particular in relation to habitat, and that the heart of the policy, Strategy 4, remains unfulfilled. Without implementing the integrated planning component so critical to the policy, I do not agree that its intent is being realized. Instead, significant decisions have been made on a relatively uninformed basis.

In this Inquiry, for example, I heard about two ad hoc initiatives that may have a significant bearing on the future management of the fishery: terminal fisheries and share-based management. Neither of these initiatives was developed in a Strategy 4 process, and neither one appears to have been informed by a socio-economic analysis. These are the kinds of initiatives that Strategy 4 is designed to address to allow for integrated, transparent, and informed decision making.

Canada must complete the implementation of the Wild Salmon Policy. To do so effectively, DFO must develop a concrete plan for what needs to be done and complete a costing exercise to understand the real costs of implementation. Canada must provide sufficient funding to ensure that the policy will be fully implemented in a timely way, and DFO must put in place a management team with responsibility and authority to direct each sector to complete the tasks needed for implementation.

Having made these general findings, I now review in more detail specific aspects of the policy and its implementation.

Implementation of strategies 1–3

Although measurable progress has been made under strategies 1 and 2, this progress has largely been in developing the methodologies required to assess and monitor the status of salmon Conservation Units (CUs) and their habitats. Little progress has been made toward actually using these methodologies. Almost nothing has been done to assess or monitor CU habitat status under Strategy 2. For Fraser River sockeye CUs, there has been one limited, incomplete status assessment under Strategy 1. No discernible

management action was taken on this status assessment (including no recovery plan). There has been no demonstrable progress on implementing Strategy 3, as it applies to Fraser River sockeye. The WSP contemplates incorporating ATK where available in relation to Strategy 1, and it may also be helpful in implementing Strategy 2 and 3. However, DFO has not sought to incorporate ATK in assessments under any of Strategies 1, 2 or 3.

It is fundamental that DFO identify biological, precautionary, science-based benchmarks for status so that it can assess and monitor sockeye health and abundance. Benchmarks must be based on science, including ATK where available, and their identification should continue to be the responsibility of DFO Science.

In my view, a sharp sectoral division of strategies 2 and 3 between the Habitat Management Program and the Science Branch could cause both gaps and overlaps. This uneven distribution could, in turn, create inefficiency and delay, and a lack of clear accountability. There is overlap in the application of strategies 2 and 3, and efficiencies could be gained from their integration. Currently, DFO is pursuing separate methodologies for habitat and ecosystem indicators under strategies 2 and 3; the Strategy 2 methodology and indicators are complete for freshwater, but the Strategy 3 methodology is still in the developmental phase. To further both strategies, DFO could use a broader array of integrated indicators for freshwater and marine habitats – and begin actually assessing and monitoring the status and quality of Fraser River sockeye habitats. I heard evidence that there are large gaps in DFO's understanding of the marine environment. DFO must put a greater effort into developing its knowledge of marine habitats, as an essential component of strategies 2 and 3. In addition, greater coordination and linkages need to be developed between existing habitat programs, such as implementation of the 1986 Habitat Policy, and the implementation of strategies 1, 2, and 3.

No single sector at DFO has all the expertise to conduct biological status, habitat, and ecosystem monitoring, to design and implement strategic watershed planning, and to translate strategic plans into annual operational plans for fisheries and habitat management, and for enhancement. In the absence of a WSP implementation program with targeted funding, DFO regional management

structured WSP governance around its existing sectoral “stovepipes.” Yet this sectoral orientation runs counter to the underlying intent of the Wild Salmon Policy – that Pacific salmon conservation and management must be more integrated.

Strategy 4 implementation

Strategy 4 is about transparent and informed decision making, using the best available information. It requires a transparent process to ensure that DFO, the minister, and all interested parties understand the competing interests and how those interests are balanced. Although DFO may need to develop arrangements with First Nations, the province, and/or municipalities to achieve some of its long-range planning objectives, many decisions can and must be made by DFO in the first instance in relation to habitat and harvest.

Current implementation efforts for Strategy 4 have not included frank discussions with stakeholders, First Nations and government about the biological and socio-economic ramifications of future harvest and recovery planning decisions. DFO did pilot, through the Fraser River Sockeye Spawning Initiative (FRSSI), the “five-step integrated planning process” in Appendix 2 of the WSP.⁶¹⁰ However, although FRSSI is a useful tool in managing the harvest (and based on the evidence I received it appears to be flexible enough to be adapted to accept WSP benchmarks for CUs once those are determined), it is not adequate for the integrated planning envisioned in Strategy 4. Similarly, the Integrated Harvest Planning Committee (IHPC) and the Integrated Fisheries Management Plan (IFMP), while relevant to managing harvest, are not sufficient to meet that integrated planning objective. Seven years after the adoption of the Wild Salmon Policy, DFO has done little of the basic groundwork necessary to begin strategic planning for CUs. Apart from Appendix 2 of the WSP itself, DFO has not adopted a strategic planning procedure to consult with other levels of government, First Nations, and stakeholders.

The failure to implement Strategy 4 integrated planning raises the concern, expressed by many fishers who appeared before me, that the only lever DFO is using to address weak stocks is curtailing harvest, through the use of the harvest-planning

tools I have just described. As a result, the harvesters are left to bear the cost of preserving CUs through forgone harvest. The companion measures contemplated in Strategy 4, including restoration measures and habitat improvements, development planning, and other measures involving all levels of government, have not come to pass.

Overall, I do not see how DFO's actions since June 2005 appropriately recognize that establishing an integrated process for salmon management will "require extensive effort and cooperation between all levels of government and many different interests."⁶¹¹ Beyond the official WSP pilot in Barkley Sound, DFO has made little progress on meeting the policy's direction that "broader and more direct linkages with First Nations governments, Provincial, Territorial and local governments need to be forged so that other land and water use activities and decisions better support the needs of salmon."⁶¹² I have not heard that DFO has pursued the requisite "strong efforts by the Department and others to build the necessary political will and commitment for these other levels of government to support and participate in the planning process."⁶¹³

I heard concerns expressed by DFO witnesses that the department had insufficient information and resources to begin implementing Strategy 4. Biological information will improve over time, but the process must begin with the information currently available. Similarly, the integrated planning process will improve over time, but the process must begin now, recognizing that it will be imperfect and will evolve as participants become more comfortable with the process. Arrangements with federal, provincial, municipal, and First Nations governments may take time to complete, but DFO must take the initial steps to develop such arrangements and continue to press to have them completed. Again, these tasks cannot delay integrated planning.

The essential components are now in place to begin the integrated planning process, recognizing that new information will be generated on a continuous basis and that decisions must be made with the best information available at any time. Mark Saunders, head of Salmon Assessment and Freshwater Ecosystems, DFO Science, testified that DFO is "at a tipping point in the implementation of the Wild Salmon Policy in that we've got the indicators for ... habitat, we've got the benchmarks, we've got the conservation units."⁶¹⁴ It is now the time to act.

The precautionary principle holds that, where there are threats of serious or irreversible harm, DFO must not rely on a lack of full scientific certainty as a reason for postponing cost-effective measures to prevent environmental degradation. DFO should therefore focus on immediate implementation of the essential steps I have highlighted below – action consistent with the precautionary principle.

I have considered whether Strategy 4 should proceed in the manner currently envisioned, with an interim planning process followed by a fully developed integrated planning process. I am concerned that this two-step process will introduce further delays in the implementation of the crucial elements of Strategy 4. In my view, the crucial elements of Strategy 4 are

- presentation of the biological status of CUs and habitat developed under strategies 1–3;
- presentation of long-term harvest and recovery strategies developed in relation to the outputs from strategies 1–3;
- socio-economic analysis of competing strategies;
- consultation with governments, First Nations, and stakeholders as to the appropriate strategies to be adopted by DFO and others;
- an open, transparent decision by the minister if DFO does not recommend the recovery of any CU in the red zone;
- implementation by DFO of all plans within its jurisdiction; and
- completion of the necessary plans and agreements with federal, provincial, municipal, and First Nations governments to ensure that any recovery plans are implemented.

Action Step 4.2 envisions a determination by the minister if recovery of a CU in the red zone will not be pursued. Action Step 4.1, in contrast, envisions immediate recovery planning for all CUs in the red zone. In my view, these two action steps must be expressly reconciled. Recovery planning and implementation require commitments of time and resources. Given the controversies among the different sectors in relation to the protection and recovery of weak stocks, it is important that a transparent decision about recovery efforts be made for those CUs in the red zone. All strategic plans must be approved by the minister. The minister may reject plans

that do not adequately conserve wild salmon, and in exceptional circumstances the minister may limit the extent of active measures taken if the recommended management action is assessed to be ineffective or if the social and economic costs will be extreme. Such decisions must be made in an open and transparent way, so that all interested parties understand the basis for the decision.

During the hearings, senior managers referred to operational harvest decisions taken to protect weak stocks as being consistent with the spirit and intent of the WSP. I disagree. The WSP requires DFO to engage in strategic planning, considering the biological, social, and economic impact of such plans. It requires ministerial approval of not only harvest plans (the IFMP) but also conservation plans. I consider recovery, or response, plans to be a form of conservation plan which requires approval.

Strategy 4 planning must first be implemented in relation to CUs in the red zone. DFO must create response plans using the best information available at the time, and it cannot delay such planning because the “best available” status assessments have not gone through DFO’s own internal review process. This planning must include an assessment of biological and socio-economic impacts, recognizing that current information is imprecise. The plans should be revisited on a regular basis to include new information and to assess the impact and effectiveness of the plans.

I am satisfied that the streamlined technical process described by Mr. Saunders and Rob Morley, vice-president of the Canadian Fishing Company, should be adopted to bring the biological information obtained through strategies 1–3 into the integrated planning process and to develop harvest and recovery strategies in relation to that biological information for consideration in the integrated process. These contemplated strategies would extend beyond the yearly planning currently done and include long-term plans for the fisheries, including proposals to move some or all of the harvest into terminal areas and to introduce a share-based fishery. I find that FRSSI is an adequate tool to develop escapement strategies for consideration and to develop total allowable mortality rules. DFO has indicated that FRSSI will continue to be improved over time, and I encourage the process to continue.

Once potential harvest and recovery strategies have been developed under the streamlined

process described above, DFO must produce socio-economic analyses in relation to these strategies. In terms of the socio-economic analysis required for planning purposes, I recommend that DFO develop internal expertise in such analysis, and I am encouraged by the evidence that at least one economist has been hired in the department.

The socio-economic analysis developed in relation to the listing decision for Cultus Lake sockeye, described in detail in Chapter 11, Cultus Lake, highlights a number of important considerations for socio-economic information generated in WSP planning. In particular, socio-economic analysis should consider

- how the cyclic nature of certain CUs will affect harvest and conservation plans;
- how the unpredictability of Fraser River sockeye will affect harvest and conservation plans;
- whether CUs can be treated differently in either harvest or conservation plans;
- the impact on food, social, and ceremonial harvests for First Nations expected to be affected by harvest or conservation plans; and
- the impact on commercial and recreational fisheries from harvest or conservation plans.

As part of its integrated planning under Strategy 4, DFO must provide all socio-economic analysis to all participants in the process in a timely way. Similarly, DFO must disclose to all participants in the planning process the underlying data relied on, except to the extent such data are proprietary to a non-governmental entity.

I discuss recommendations to the IFMP elsewhere in this Report. I find that the IFMP is consistent with the WSP in relation to the implementation of yearly harvest decisions. These harvest decisions must be consistent with and informed by the long-term integrated strategic planning developed through Strategy 4.

Implementation planning

DFO must do more than implement the spirit and intent of the Wild Salmon Policy. The department had already codified guiding principles for salmon management in the New Directions Policy. The three key principles in that policy are conservation,

sustainable use, and improved decision making. These principles are reiterated in the WSP, with the added fourth principle of honouring obligations to First Nations. However, the three principles were not made operational in New Directions, and thus DFO made “a commitment to more clearly articulate detailed operational policies associated with these three themes.” Specifically, DFO committed to develop a wild salmon policy.⁶¹⁵ Once approved, the WSP made these principles operational by requiring information gathering and decision making to focus on Conservation Units and by mandating an integrated planning process where participants would together identify specific conservation objectives and targets.

In my view, documenting DFO’s commitments in a multi-year implementation plan setting out tasks and timelines in detail, along with the associated human and financial resources, is a fundamental requirement to implementing the Wild Salmon Policy. An implementation plan requires government to consider, and plan for, the human and financial resources likely to be necessary for implementation in the longer term. It provides government with clear deliverables and timelines. An implementation plan is required to measure performance and to ensure accountability.

I find that DFO has not developed an implementation plan as contemplated in the Wild Salmon Policy. I do not agree that DFO can properly implement the policy guided only by a series of short tables, proposed internally by mid-level staff to regional managers for work-planning purposes (not distributed to the public) and revised annually. It is my view that the WSP’s strategies and action steps, whether scientific or otherwise, can and should be subjected to timelines. If Canada and DFO assigned WSP implementation activities clearly by priority, support, and leadership, and all to be completed within a certain schedule, I am confident that the department’s scientists and managers would be up to the task.

Implementation costing and resourcing

I find that DFO has not tried to determine the cost of WSP implementation. It does not know the cost

of the science needed to complete implementation, the cost of ongoing assessment and monitoring, or the cost of the planning processes under Strategy 4. Nor has it attempted to devise any long-term funding strategy. The sole exception to this finding is the work done by Heather Stalberg, senior biologist with the Oceans, Habitat and Enhancement Branch (OHEB), and Rebecca Reid, former regional director of OHEB, to estimate the cost of implementing Strategy 2 – work that DFO appears to have largely ignored.

Although a number of senior managers testified that the WSP could be implemented within existing budgets, I do not find this evidence convincing. Many of these same senior managers told me they were implementing the spirit and intent of the WSP. As already noted, I do not accept that to be adequate implementation. Adequate implementation goes further and will require additional funds.

Overall, I conclude that the implementation of the Wild Salmon Policy has been deprived of a reasonable funding commitment, in both the medium term and the long term. As a result, its implementation has been slow, inconsistent among branches, and ad hoc. Without adequate funding for the fundamental components of the Wild Salmon Policy, Canada is not able to meet the commitments it has made in the policy and by its acceptance of the precautionary approach.

I accept that some of the required resources can continue to be found in existing budgets; for example, stock assessment programs already support the status assessment of some metrics for some Fraser River sockeye CUs, and perhaps some of the required habitat assessment and monitoring can be done within the existing Habitat Management Program. Yet other resources – such as financial and human resources for monitoring and assessing the status of habitat under Strategy 2, or adequate habitat restoration under the Salmonid Enhancement Program – may not currently exist within DFO. Ideally, with DFO taking the initiative in the future to develop WSP monitoring partnerships, habitat monitoring resources may eventually be augmented by contributions, either funds or monitoring effort, by the province, First Nations, and others. However, DFO cannot rely primarily on contributions by other stakeholders to implement its policy obligations.

Governance for implementation

I find that the regional director general (RDG) has overall responsibility for implementation of the Wild Salmon Policy. However, the RDG has responsibility for all sectors and programs. Currently, there is no one senior official within DFO's Pacific Region responsible for providing operational direction on WSP implementation. Responsibility is dispersed through Science, Fisheries and Aquaculture Management, and OHEB. Moreover, as Mr. Sprout testified, the sectors share responsibilities for some strategies and aspects of WSP implementation. In this way, the lines of accountability for WSP implementation are weak and diffuse.

I find that the Policy Branch does not have responsibility for WSP implementation. The Policy Branch has responsibility for coordination, and this role is undertaken by a relatively junior employee, the WSP coordinator. A number of witnesses identified limitations on the "coordinator model" of WSP governance. Working at a relatively junior level within one sector, this person cannot exercise

significant influence over the activities of other sectors, and indeed may lack influence over Policy's own regional director.

Given the fundamental need for integration, I am of the view that DFO requires a new senior manager to directly oversee WSP implementation – in effect, an "integrator." In order to achieve greater integration, direction, vision, and accountability, this official must transcend individual sectors and must be able to control and direct the use of the required financial and human resources. In short, the official should have overall operational responsibility for WSP implementation, including responsibility for financial resources directed at implementation and ongoing activities. Such oversight is particularly important to develop interim recovery and strategic planning processes and to ensure that they inform management decisions. It appears to me that an associate regional director general is likely in the best position to take on responsibility for WSP implementation, and a new position should be created for this role.

These findings and any related recommendations are discussed in Volume 3 of this Report.

Notes

- 1 Exhibit 102, p. 1.
- 2 Transcript, September 22, 2011, pp. 44–45.
- 3 Transcript, November 29, 2010, pp. 44–45.
- 4 Transcript, March 4, 2011, pp. 64, 66.
- 5 Exhibit 8, p. 8.
- 6 Exhibit 32; Exhibit 96, pp. 2–3; Paul Macgillivray, Transcript, November 1, 2010, pp. 68, 89–91.
- 7 Exhibit 32, pp. 5, 12–13.
- 8 Exhibit 730, p. 20.
- 9 Exhibit 14, p. 153.
- 10 Exhibit 88, pp. 1, 5–6.
- 11 Transcript, November 30, 2010, p. 3. See also Transcript, December 1, 2010, p. 69.
- 12 Transcript, October 25, 2010, pp. 70–71.
- 13 Transcript, November 29, 2010, p. 10; Transcript, December 1, 2010, p. 69.
- 14 Transcript, March 8, 2011, pp. 54–56. See also Exhibit 553, pp. 31–32.
- 15 See Exhibit 97, Dr. Riddell's presentation entitled "The Build-Up to Canada's Policy for Conservation of Wild Pacific Salmon (1980–2000)." This presentation includes an explanation of the scientific development of Conservation Units, which are discussed later in this chapter. See also Dr. Riddell's speaking notes for this presentation (Exhibit 98) and his testimony at Transcript, November 29, 2010, pp. 6–14.
- 16 Brian Riddell, Transcript, November 29, 2010, pp. 7–8; Exhibit 8, p. 43.
- 17 Transcript, November 29, 2010, pp. 9–10. See also Exhibit 97, p. 7.
- 18 Transcript, December 1, 2010, p. 28.
- 19 Transcript, February 9, 2011, pp. 38–39.
- 20 Exhibit 8, pp. 8–9.
- 21 Jim Irvine, Transcript, November 29, 2010, p. 51.
- 22 Exhibit 101, pp. 1–2.
- 23 Exhibit 100, pp. 2–3.
- 24 Pat Chamut, Transcript, November 29, 2010, p. 25; Exhibit 100, pp. 2–3.
- 25 Transcript, December 1, 2010, p. 117. See also Exhibit 101, p. 2, and Exhibit 103, p. 1, regarding the instrumental leadership role played by Mr. Chamut.
- 26 Transcript, December 1, 2010, pp. 115–16.
- 27 Transcript, November 29, 2010, pp. 38–39.
- 28 Mark Saunders, Transcript, November 29, 2010, pp. 38–39.
- 29 Exhibit 101, p. 3.
- 30 Transcript, November 30, 2010, pp. 79–80. See also Jim Irvine, Transcript, November 30, 2010, pp. 22, 42, and Exhibit 8, p. 8.
- 31 Transcript, December 1, 2010, p. 93.
- 32 Pat Chamut, Transcript, November 29, 2010, pp. 26–27.
- 33 Exhibit 92.
- 34 Transcript, November 29, 2010, p. 27.
- 35 Transcript, November 29, 2010, p. 28.
- 36 Exhibit 8, p. 38.
- 37 Exhibit 8, p. 40.
- 38 See Exhibit 8, pp. 10, 38.
- 39 Transcript, December 1, 2010, pp. 64–65.
- 40 Transcript, November 29, 2010, p. 11. See also Transcript, November 30, 2010, p. 10, and Transcript, December 1, 2010, pp. 65–66.
- 41 Brian Riddell, Transcript, November 30, 2010, pp. 10–11. See also Transcript, December 1, 2010, pp. 66–67.
- 42 Transcript, December 1, 2010, pp. 19–20.
- 43 Transcript, November 30, 2010, pp. 18–19.

- 44 Transcript, November 30, 2010, p. 83; Transcript, December 2, 2010, pp. 10–11.
- 45 Exhibit 85.
- 46 Exhibit 104A, p. 13
- 47 Exhibit 91, pp. 19, 26, 31.
- 48 Transcript, December 2, 2010, pp. 79–80. The Fishery Decision-Making Framework is Exhibit 185.
- 49 Jim Irvine, Transcript, November 29, 2010, p. 60, and November 30, 2010, p. 27.
- 50 Transcript, November 29, 2010, p. 59.
- 51 Jim Irvine, Transcript, December 2, 2010, p. 5.
- 52 Transcript, November 29, 2010, p. 38.
- 53 Transcript, November 30, 2010, p. 48.
- 54 Transcript, November 30, 2010, p. 27.
- 55 Transcript, November 29, 2010, p. 60. See also Exhibit 103, pp. 1–2.
- 56 Transcript, November 30, 2010, pp. 30–31, 80–81.
- 57 Exhibit 100, pp. 3–4; Exhibit 101, p. 2.
- 58 Transcript, December 1, 2010, p. 71.
- 59 Transcript, November 29, 2010, p. 37.
- 60 Exhibit 99, p. 4. See also Jim Irvine, Transcript, November 30, 2010, p. 18; Brian Riddell, Transcript, November 30, 2010, p. 17, and November 29, 2010, pp. 37–38.
- 61 Transcript, June 1, 2011, pp. 83–84.
- 62 Exhibit 103, p. 1.
- 63 Exhibit 103, pp. 1–2.
- 64 Transcript, November 30, 2010, p. 28.
- 65 Transcript, November 29, 2010, pp. 67–68; Transcript, December 1, 2010, pp. 10–11.
- 66 Mark Saunders, Transcript, November 29, 2010, p. 84. See also Brian Riddell, Transcript, November 29, 2010, p. 14, and Jim Irvine, Transcript, November 29, 2010, p. 54.
- 67 Exhibit 8, p. 29.
- 68 Transcript, December 1, 2010, p. 85.
- 69 Transcript, November 30, 2010, pp. 37–38.
- 70 Transcript, May 12, 2011, p. 81.
- 71 Transcript, November 30, 2010, pp. 103–4.
- 72 Transcript, November 30, 2010, pp. 104–5.
- 73 Pat Chamut, Transcript, November 30, 2010, p. 67. Exhibit 91 is the December 2004 draft entitled A Policy Framework for Conservation of Wild Pacific Salmon.
- 74 Exhibit 96, p. 5.
- 75 Jim Irvine, Transcript, November 29, 2010, p. 57; Exhibit 96, p. 5; Exhibit 100, p. 4.
- 76 Jim Irvine, Transcript, November 30, 2010, p. 82; Exhibit 96, p. 5.
- 77 Exhibit 93, p. 2; Exhibit 94, p. 2.
- 78 Transcript, November 29, 2010, p. 42. See also Jim Irvine, Transcript, November 29, 2010, p. 57.
- 79 Transcript, November 29, 2010, pp. 31–32. See also Transcript, November 30, 2010, p. 93.
- 80 Transcript, December 1, 2010, p. 115.
- 81 Exhibit 93, pp. 11, 16.
- 82 Transcript, November 29, 2010, p. 34. See also Transcript, November 29, 2010, p. 77.
- 83 Exhibit 100, p. 5.
- 84 Exhibit 103, p. 2; Mark Saunders, Transcript, November 30, 2010, p. 26.
- 85 Exhibit 93, pp. 4–5.
- 86 Transcript, December 1, 2010, p. 103.
- 87 Exhibit 123A is the memorandum to the deputy minister, and Exhibit 123B is the associated transmittal slip. Mr. Saunders testified that there was a typo in Exhibit 123A and that the references to June 24, 2004, should have been to 2005. See Transcript, December 1, 2010, pp. 100–1.
- 88 Transcript, December 1, 2010, pp. 106–7.
- 89 Transcript, October 28, 2010, p. 67. See also Transcript, October 28, 2010, pp. 78–79.
- 90 Written submissions of the West Coast Trollers Area G Association and the United Fishermen and Allied Workers' Union, p. 74.
- 91 Oral submissions of the West Coast Trollers Area G Association and the United Fishermen and Allied Workers' Union, Transcript, November 9, 2011, p. 6.
- 92 *Oceans Act*, SC 1996, c. 31, Preamble.
- 93 Transcript, September 23, 2011, pp. 55, 64–66.
- 94 Transcript, December 16, 2010, p. 35.
- 95 Transcript, September 23, 2011, p. 83.
- 96 Transcript, December 9, 2010, p. 55.
- 97 Transcript, September 23, 2011, p. 84.
- 98 Transcript, July 7, 2011, p. 56.
- 99 Transcript, June 1, 2011, p. 79. See also Transcript, June 1, 2011, pp. 89–91.
- 100 Transcript, June 1, 2011, pp. 78–80.
- 101 Exhibit 8, p. 35.
- 102 Exhibit 93, pp. 11–16.
- 103 Exhibit 170; Exhibit 135; Exhibit 109.
- 104 Transcript, December 9, 2010, pp. 42–44.
- 105 Transcript, December 9, 2010, pp. 45–46, 51–52.
- 106 Exhibit 109.
- 107 Exhibit 109, p. 20.
- 108 Transcript, December 9, 2010, pp. 42–43.
- 109 Exhibit 109, pp. 10, 20.
- 110 Exhibit 213; Exhibit 137B.
- 111 Jim Irvine, Transcript, December 2, 2010, p. 44. See also Mark Saunders, Transcript, November 29, 2010, p. 78.
- 112 Transcript, December 2, 2010, pp. 36–37.
- 113 Transcript, September 27, 2011, p. 21. See also Exhibit 964, the 2011–12 draft internal staff work plan.
- 114 Transcript, September 27, 2011, p. 23.
- 115 Transcript, March 4, 2011, pp. 12–13.
- 116 Exhibit 82, p. 2.
- 117 Exhibit 204; Heather Stalberg, Transcript, December 7, 2010, pp. 29–30, and December 8, 2010, p. 47.
- 118 Exhibit 244, p. 2; Transcript, December 9, 2010, pp. 40–41.
- 119 Transcript, December 9, 2010, p. 41, and September 27, 2011, p. 24.
- 120 Transcript, September 22, 2011, p. 45. See also Transcript, September 28, 2011, p. 105.
- 121 Transcript, September 22, 2011, p. 58.
- 122 Transcript, September 22, 2011, pp. 59–60.
- 123 Transcript, September 22, pp. 51–52.
- 124 Transcript, September 23, 2011, pp. 85–86.
- 125 Transcript, September 23, 2011, p. 83.
- 126 Transcript, June 1, 2011, p. 82. See also Exhibit 1217, p. 1.
- 127 Exhibit 8, p. 16.
- 128 Exhibit 183, p. 2; Kim Hyatt, Transcript, December 2, 2010, pp. 29–30.
- 129 Transcript, December 3, 2010, p. 69.
- 130 Transcript, December 7, 2010, pp. 3–4. See also Neil Schubert, Transcript, May 31, 2011, p. 83.
- 131 Exhibit 1992A, p. 27.
- 132 Exhibit 143.
- 133 Exhibit 143, pp. 276–89.
- 134 Kim Hyatt, Transcript, December 2, 2010, pp. 53–54.
- 135 Exhibit 184, pp. 29–32.
- 136 Transcript, December 7, 2010, p. 53.
- 137 Transcript, December 2, 2010, pp. 65, 73.
- 138 Exhibit 184, p. 2.
- 139 Exhibit 184, p. 166.
- 140 Transcript, December 2, 2010, p. 73.
- 141 Canada's reply submissions, pp. 69–70.
- 142 Transcript, September 22, 2011, p. 53. See also Exhibit 1915 (Grant Draft 2011).
- 143 Transcript, September 22, 2011, p. 56.
- 144 Transcript, September 22, 2011, p. 54.
- 145 Exhibit 1915, pp. 117–18.

- 146 Mark Saunders, Transcript, December 2, 2010, p. 55.
- 147 See the Holt paper entitled "Indicators of Status and Benchmarks for Conservation Units in Canada's Wild Salmon Policy" (Exhibit 153) and a companion document (Exhibit 154).
- 148 Carrie Holt, Transcript, December 2, 2010, pp. 77–79.
- 149 Carrie Holt, Transcript, December 2, 2010, pp. 58, 65–66; Mark Saunders, Transcript, December 2, pp. 57–58.
- 150 Mark Saunders, Transcript, December 8, 2010, p. 76.
- 151 Transcript, July 4, 2011, pp. 71–72; Exhibit 8, p. 17.
- 152 Transcript, December 7, 2010, pp. 3, 93.
- 153 Carrie Holt, Transcript, December 7, 2010, pp. 91–92.
- 154 See Grant Draft 2010 (Exhibit 184, p. viii) and Grant Draft 2011 (Exhibit 1915, p. vii).
- 155 Kim Hyatt, Transcript, December 2, 2010, pp. 56–57.
- 156 Transcript, December 2, 2010, pp. 28–29.
- 157 Exhibit 1972.
- 158 Carrie Holt, Transcript, December 2, 2010, pp. 28, 77, and December 7, 2010, p. 6; Mark Saunders, Transcript, December 7, 2010, pp. 8–9.
- 159 Exhibit 8, p. 17.
- 160 Transcript, December 3, 2010, p. 38.
- 161 Exhibit 8, pp. 17–18.
- 162 Exhibit 8, p. 17.
- 163 See Exhibit 185 (*A Fishery Decision-Making Framework Incorporating the Precautionary Approach*). The date this framework was published or released is not in evidence. From its content, it appears to post-date 2006. Mr. Bevan testified, however, that it dated to the early or mid-2000s. See Transcript, September 23, 2011, p. 62.
- 164 Transcript, December 16, 2011, p. 1.
- 165 Transcript, September 26, 2011, p. 88.
- 166 Transcript, September 27, 2011, pp. 74–78.
- 167 Transcript, December 2, 2010, pp. 79–80. See also Exhibit 185.
- 168 Transcript, December 2, 2010, pp. 79–80.
- 169 Exhibit 182, p. 1.
- 170 Transcript, December 7, 2010, p. 7. See also Mark Saunders, Transcript, December 2, 2010, pp. 50–60.
- 171 Transcript, February 2, 2011, p. 32.
- 172 Transcript, February 2, 2011, p. 81.
- 173 Transcript, February 2, 2011, pp. 62–63.
- 174 Exhibit 8, pp. 18–19.
- 175 Mark Saunders, Transcript, December 2, 2010, p. 59; Jim Irvine, Transcript, December 7, 2010, pp. 7–8.
- 176 Mark Saunders, Transcript, December 7, 2010, pp. 8–9.
- 177 Exhibit 8, pp. 20–21.
- 178 Transcript, June 7, 2011, p. 91.
- 179 Exhibit 8, pp. 20–22.
- 180 Brian Riddell, Transcript, November 29, 2010, p. 79.
- 181 Exhibit 148, p. 7.
- 182 Exhibit 176; Heather Stalberg, Transcript, December 2, 2010, pp. 24–25.
- 183 Transcript, December 3, 2010, pp. 6–7.
- 184 Heather Stalberg, Transcript, December 7, 2010, p. 34. See also Exhibit 168, p. 1, and Exhibit 963, p. 2.
- 185 Rebecca Reid, Transcript, April 5, 2011, p. 7.
- 186 Exhibit 964, pp. 1–3.
- 187 Exhibit 204, p. 7. See also Rebecca Reid, Transcript, April 4, 2011, pp. 40–41.
- 188 Transcript, April 4, 2011, pp. 41–42.
- 189 Rebecca Reid, Transcript, April 4, 2011, p. 15, and April 5, 2011, p. 7; Jason Hwang, Transcript, April 4, 2011, pp. 15, 27, 75; Dave Carter, Transcript, April 6, 2011, p. 34.
- 190 Transcript, December 2, 2010, pp. 60–61.
- 191 Transcript, April 4, 2011, p. 40.
- 192 Transcript, April 4, 2011, p. 26.
- 193 Transcript, December 9, 2010, pp. 81–82.
- 194 Transcript, December 9, 2010, p. 26. See also Transcript, September 27, 2011, p. 82.
- 195 Transcript, December 3, 2010, pp. 5–6.
- 196 Transcript, December 7, 2010, p. 10.
- 197 Transcript, December 7, 2010, pp. 11, 14.
- 198 Heather Stalberg, Transcript, December 7, 2010, p. 10. See also Exhibit 148, p. 21.
- 199 Transcript, June 3, 2011, pp. 53–54.
- 200 Transcript, June 3, 2011, pp. 53–54.
- 201 Transcript, April 5, 2011, p. 58.
- 202 Transcript, June 1, 2011, p. 20.
- 203 Transcript, June 1, 2011, p. 90.
- 204 Mark Saunders, Transcript, November 29, 2010, p. 84.
- 205 Exhibit 175. See also Exhibit 158, and Heather Stalberg, Transcript, December 7, 2010, pp. 20–22.
- 206 Transcript, June 1, 2011, p. 90. See also Transcript, June 1, 2011, p. 80.
- 207 Transcript, April 4, 2011, pp. 43–44, 75.
- 208 Transcript, June 1, 2011, p. 90.
- 209 Mark Saunders, Transcript, December 2, 2010, pp. 39–40; Exhibit 965, p. 29.
- 210 Exhibit 8, p. 21.
- 211 Exhibit 965, pp. 26–32.
- 212 Transcript, December 3, 2010, p. 4.
- 213 Transcript, June 8, 2011, p. 92.
- 214 Transcript, April 6, 2011, p. 52.
- 215 Transcript, April 6, 2011, p. 18.
- 216 Transcript, April 6, 2011, p. 17.
- 217 Transcript, December 3, 2010, pp. 49–50.
- 218 Transcript, December 7, 2010, p. 35.
- 219 Exhibit 260, p. 21.
- 220 Transcript, December 3, 2010, p. 50.
- 221 Transcript, December 7, 2010, p. 35.
- 222 Susan Farlinger, Transcript, December 9, 2010, p. 82; Mark Saunders, Transcript, December 3, 2011, pp. 50–51.
- 223 Transcript, December 3, 2011, pp. 50–51.
- 224 Transcript, December 3, 2011, pp. 47–48.
- 225 Transcript, June 1, 2011, pp. 93–94.
- 226 Exhibit 8, p. 22.
- 227 Exhibit 151, p. 1. See also Heather Stalberg, Transcript, December 3, 2010, p. 14.
- 228 Heather Stalberg and Mark Saunders, Transcript, December 3, 2010, p. 15.
- 229 Transcript, December 3, 2010, p. 13.
- 230 Exhibit 965, p. 29.
- 231 Transcript, December 2, 2010, p. 61.
- 232 Exhibit 8, p. 23.
- 233 Exhibit 8, pp. 22–23.
- 234 Jim Irvine and Kim Hyatt, Transcript, December 3, 2010, p. 29. See also Mark Saunders, Transcript, December 3, 2010, pp. 66–67.
- 235 Transcript, December 3, 2010, pp. 29, 70.
- 236 Transcript, December 3, 2010, pp. 25–26, 29.
- 237 Transcript, December 8, 2010, pp. 58–59.
- 238 Transcript, December 7, 2010, pp. 44–45.
- 239 Transcript, December 3, 2010, pp. 23–25.
- 240 Transcript, December 3, 2010, p. 20.
- 241 Transcript, December 8, 2010, pp. 61–62.
- 242 Transcript, December 3, 2011, p. 21, and December 8, 2010, p. 61. See also Exhibit 965, p. 13.
- 243 Exhibit 186; Kim Hyatt, Transcript, December 7, 2010, p. 39.
- 244 Transcript, December 3, 2010, pp. 19–20.
- 245 Exhibit 186, p. 7. See also exhibit 200, p. 4, and Kim Hyatt, Transcript, December 7, 2010, pp. 41–42.
- 246 Kim Hyatt, Transcript, December 3, 2010, p. 24.
- 247 Transcript, December 2, 2010, pp. 61–62.
- 248 Transcript, December 8, 2010, pp. 3–4.
- 249 Transcript, September 22, 2011, p. 57.
- 250 Transcript, July 4, 2011, pp. 71–72.
- 251 Exhibit 965, p. 30.

- 252 Exhibit 8, p. 23.
- 253 Transcript, December 3, 2010, pp. 25–26.
- 254 Transcript, December 3, 2010, pp. 25–26. See also State of the Ocean Reports for 2006 (Exhibit 1354), 2007 (Exhibit 1355), 2008 (Exhibit 1356), and 2009 (Exhibit 1326).
- 255 Transcript, December 3, 2010, pp. 25–26.
- 256 Transcript, December 3, 2010, p. 27.
- 257 Transcript, December 7, 2010, pp. 47–48.
- 258 Transcript, December 3, 2010, p. 26.
- 259 Exhibit 8, p. 24.
- 260 Exhibit 8, p. 24.
- 261 Transcript, December 1, 2010, pp. 96–97.
- 262 Exhibit 100, p. 3.
- 263 Transcript, June 3, 2011, pp. 30–31.
- 264 Transcript, June 3, 2011, p. 31.
- 265 Transcript, December 9, 2010, p. 29.
- 266 Transcript, November 30, 2010, pp. 30–31.
- 267 Transcript, June 2, 2011, p. 9.
- 268 Paul Ryall, Transcript, June 3, 2011, pp. 68–69; Susan Farlinger, Transcript, March 4, 2011, pp. 67–68; Exhibit 99, p. 4.
- 269 Transcript, June 1, 2011, p. 90.
- 270 Transcript, June 1, 2011, p. 79.
- 271 Transcript, June 1, 2011, pp. 79–80.
- 272 Transcript, June 1, 2011, pp. 77–78.
- 273 Transcript, June 3, 2011, pp. 31–32.
- 274 Exhibit 971, p. 1; Exhibit 951, p. 7.
- 275 Transcript, June 3, 2011, p. 32.
- 276 Transcript, June 3, 2011, p. 32.
- 277 Paul Ryall, Transcript, June 3, 2011, pp. 25–26.
- 278 See, for example, Exhibit 951; Exhibit 970; Exhibit 971; Paul Ryall, Transcript, June 3, 2011, pp. 14–15, 25–29; Mark Saunders, Transcript, June 3, 2011, p. 26.
- 279 Exhibit 8, pp. 25–26.
- 280 Exhibit 941, p. 2.
- 281 Mark Saunders and Paul Ryall, Transcript, June 2, 2011, pp. 67–69; Paul Sprout, Transcript, December 9, 2010, p. 41. See also Exhibits 238, 941, 943, 951, 970, and 971.
- 282 Exhibit 184.
- 283 Mark Saunders, Transcript, June 2, 2011, pp. 65–66, and June 3, 2011, pp. 7–8. See also Exhibits 184, 562, 572.
- 284 Exhibit 970, p. 2.
- 285 Exhibit 971, p. 2.
- 286 Transcript, June 2, 2011, pp. 65–66.
- 287 Transcript, June 3, 2011, p. 99.
- 288 Transcript, June 3, 2011, p. 28.
- 289 Paul Ryall, Transcript, June 2, 2011, p. 82; Mark Saunders and Paul Ryall, Transcript, June 3, 2011, p. 29.
- 290 See Exhibit 571, which summarizes the results of Exhibit 184 (Grant Draft 2010), Exhibit 572 (Pestal and Cass 2009, *Using Qualitative Risk Evaluations to Prioritize Resource Assessment Activities for Fraser River Sockeye*), and Exhibit 562 (Technical Report 3, Freshwater Ecology).
- 291 Transcript, June 3, 2011, pp. 102–3.
- 292 Transcript, June 3, 2011, pp. 101–2.
- 293 Transcript, June 2, 2011, pp. 73, 75.
- 294 Transcript, June 2, 2011, p. 73.
- 295 Transcript, June 2, 2011, pp. 73–74.
- 296 Exhibit 8, p. 26.
- 297 Exhibit 8, p. 26.
- 298 Exhibit 8, pp. 32–33.
- 299 Exhibit 8, pp. 26, 33.
- 300 Exhibit 1915, p. 16.
- 301 Mike Lapointe, Transcript, January 26, 2011, p. 87.
- 302 Rob Morley, Transcript, February 7, 2011, p. 59.
- 303 Transcript, November 30, 2010, pp. 13–14.
- 304 Transcript, July 4, 2011, pp. 70–73.
- 305 Transcript, July 4, 2011, pp. 72–73.
- 306 First Nations Coalition's written submissions, p. 269.
- 307 Transcript, June 2, 2011, p. 58.
- 308 Transcript, June 2, 2011, pp. 58–59.
- 309 Transcript, June 3, 2011, p. 76.
- 310 PPR 5, p. 35.
- 311 Jeff Grout, Transcript, January 17, 2011, pp. 40–42, 45–46; Exhibit 322, p. 2.
- 312 PPR 5, p. 39. See also Al Cass, Transcript, February 7, 2011, p. 26; Jeff Grout, Transcript, January 17, 2011, p. 35; Exhibit 322, p. 8.
- 313 Written submissions of the West Coast Trollers Area G Association and the United Fishermen and Allied Workers' Union, p. 74.
- 314 Transcript, December 16, 2010, p. 29.
- 315 Transcript, February 7, 2011, pp. 30–31; Transcript, June 3, 2011, p. 8.
- 316 Transcript, June 3, 2011, p. 8.
- 317 Transcript, June 3, 2011, p. 37.
- 318 Transcript, June 3, 2011, p. 38. See also Transcript, June 1, 2011, p. 82.
- 319 Transcript, June 3, 2011, p. 33.
- 320 Transcript, June 1, 2011, p. 84.
- 321 Transcript, June 3, 2011, pp. 64–65.
- 322 Transcript, June 3, 2011, p. 33.
- 323 Transcript, February 7, 2011, p. 30.
- 324 Transcript, February 7, 2011, pp. 82–83; February 8, 2011, p. 69.
- 325 Transcript, February 7, 2011, pp. 83–84.
- 326 Transcript, February 8, 2011, p. 71.
- 327 Transcript, June 2, 2011, p. 83.
- 328 Transcript, June 2, 2011, pp. 97–98.
- 329 Transcript, June 2, 2011, p. 95.
- 330 Transcript, June 2, 2011, p. 79.
- 331 Transcript, January 21, 2011, p. 21.
- 332 Transcript, January 24, 2011, p. 42.
- 333 Transcript, June 3, 2011, pp. 104–6.
- 334 Transcript, February 11, 2011, pp. 55–56.
- 335 Transcript, June 3, 2011, p. 32.
- 336 Transcript, February 11, 2011, p. 53.
- 337 Transcript, June 2, 2011, pp. 9–10.
- 338 Exhibit 8, p. 29.
- 339 Exhibit 962, p. 17.
- 340 Exhibit 970, pp. 2–3.
- 341 Exhibit 971, p. 2.
- 342 Transcript, June 3, 2011, pp. 15–16, p. 83. See also Exhibit 952, Mr. Fraser's report entitled *Identifying Planning Units and Prioritizing Strategic Planning Initiatives under the Wild Salmon Policy*.
- 343 Transcript, June 3, 2011, p. 37.
- 344 Transcript, June 2, 2011, p. 80.
- 345 Transcript, June 2, 2011, pp. 83–84.
- 346 See reports to the Operations Committee in 2008 (Exhibit 192, pp. 20, 41), 2009 (Exhibit 240, p. 16), 2010 (Exhibit 238, pp. 16, 19), and to the Strategic Directions Committee in 2011 (Exhibit 951).
- 347 Exhibit 1219, p. 3; Exhibit 1218, pp. 2–3.
- 348 Exhibit 1216, pp. 1–2; Exhibit 1217, p. 2.
- 349 Exhibit 951, p. 12.
- 350 Transcript, August 18, 2011, p. 8.
- 351 Transcript, June 8, 2011, p. 92.
- 352 Transcript, December 8, 2010, pp. 31–32.
- 353 Transcript, June 3, 2011, pp. 8–9.
- 354 Transcript, June 3, 2011, pp. 51, 93.
- 355 Transcript, June 3, 2011, p. 93.
- 356 Exhibit 965, p. 31; Exhibit 964, p. 7; Exhibit 962, p. 17.
- 357 Transcript, June 2, 2011, p. 72.
- 358 Exhibit 950.
- 359 Transcript, December 16, 2010, p. 91.
- 360 Transcript, March 4, 2011, p. 34.
- 361 Transcript, December 16, 2010, p. 91.

- 362 Transcript, March 4, 2011, pp. 6–7.
 363 Transcript, June 3, 2011, p. 33.
 364 Rob Morley, Transcript, February 7, 2011, pp. 68–72.
 365 Transcript, February 7, 2011, pp. 68–69, 71; Transcript, March 1, 2011, p. 30.
 366 Transcript, February 7, 2011, pp. 71–72.
 367 Transcript, June 3, 2011, pp. 97–98.
 368 Transcript, June 3, 2011, p. 52.
 369 Transcript, June 3, 2011, pp. 52–53.
 370 Transcript, June 3, 2011, p. 13.
 371 Transcript, December 8, 2010, p. 69.
 372 Exhibit 224.
 373 Transcript, June 2, 2011, pp. 41–43.
 374 Exhibit 944.
 375 Exhibit 944, p. 90.
 376 Transcript, June 2, 2011, pp. 86–87.
 377 Transcript, February 9, 2011, pp. 38–39.
 378 Exhibit 8, pp. 32–33.
 379 Transcript, June 3, 2011, pp. 46–47.
 380 Exhibit 8, p. 34.
 381 Exhibit 8, p. 34.
 382 Exhibit 8, p. 34.
 383 Exhibit 960, p. 3.
 384 Exhibit 959.
 385 Exhibit 1992A.
 386 See WSP work plans for the following years: 2006–7 (Exhibit 195); 2007–8 (Exhibit 110); 2009–10 (Exhibit 225); 2011–12 (Exhibit 964).
 387 Transcript, March 4, 2011, p. 8.
 388 Transcript, December 8, 2010, p. 86. See also Exhibit 219.
 389 Mark Saunders, Transcript, December 8, 2010, pp. 92–93; Exhibit 189, pp. 1 and 2.
 390 Paul Ryall, Transcript, June 2, 2011, pp. 88–89. See also Exhibit 945 (Meeting Inventory Description) and Exhibit 945A (Meeting Inventory Spreadsheet).
 391 Exhibit 945, p. 1; Exhibit 945A, main page.
 392 Exhibit 945, p. 1; Exhibit 945A, see link to “WSP Implementation – Wild Salmon Policy Workshops.”
 393 Exhibit 945A, main page.
 394 Exhibit 945A, see links under “WSP Implementation.”
 395 Transcript, June 30 2011, p. 97.
 396 Transcript, July 4, 2011, p. 71.
 397 Exhibit 945A, main page, and link to “DFO–BC Processes.”
 398 Transcript, June 3, 2011, pp. 22, 92; Exhibit 967, p. 2.
 399 Kim Hyatt, Transcript, December 3, 2010, pp. 41–42.
 400 Transcript, September 23, 2011, p. 84.
 401 Transcript, June 1, 2011, p. 92.
 402 Transcript, June 1, 2011, p. 99.
 403 Transcript, June 2, 2011, p. 19.
 404 Brian Riddell, Transcript, June 1, 2011, p. 88.
 405 Transcript, June 1, 2011, pp. 88–89, and June 2, 2011, p. 40.
 406 Transcript, June 1, 2011, pp. 93–94.
 407 Paul Sprout, Transcript, December 16, 2010, p. 64.
 408 Exhibit 8, p. 29.
 409 Transcript, December 16, 2010, pp. 89–90.
 410 Transcript, June 3, 2011, pp. 29–30; Exhibit 951, p. 4.
 411 Transcript, December 16, 2010, pp. 64–65.
 412 Transcript, November 30, 2010, pp. 32–35.
 413 Paul Sprout, Transcript, December 9, 2010, p. 78; Exhibit 95, p. 2.
 414 Transcript, December 9, 2010, pp. 78–79.
 415 Exhibit 140, p. 2.
 416 Transcript, December 16, 2010, pp. 88–89.
 417 Transcript, December 16, 2010, pp. 23–26.
 418 Transcript, June 3, 2011, p. 92.
 419 Transcript, December 3, 2010, pp. 40–41, 43–44.
 420 Transcript, December 8, 2010, pp. 31–32.
 421 Exhibit 313, p. 2. See also Transcript, December 8, 2010, pp. 30–31, and Transcript, December 3, 2010, pp. 41–42.
 422 Transcript, December 3, 2010, pp. 42–43. See also Exhibit 183, p. 5.
 423 Transcript, December 9, 2010, pp. 79–80, and December 16, 2010, pp. 87–88. See also Michael Crowe, Transcript, June 8, 2011, p. 27.
 424 Transcript, December 16, 2010, p. 90.
 425 See, for example, Exhibits 220, 220A, and 220B.
 426 Transcript, December 8, 2010, pp. 77–78, 106.
 427 Transcript, July 4, 2011, pp. 71–72.
 428 Exhibit 8, p. 9.
 429 Exhibit 8, pp. 16, 45. See also Jim Irvine, Transcript, November 29, 2010, pp. 64–65.
 430 Exhibit 213, pp. 4–7; Exhibit 217; Mark Saunders, Transcript, December 8, 2010, pp. 73–74.
 431 Transcript, December 8, 2010, pp. 94–96; Exhibit 222; Exhibit 223.
 432 Exhibit 223.
 433 Exhibit 237, p. 1. See also Exhibit 187.
 434 Exhibit 201, pp. 7–8; Exhibit 239, pp. 5–6.
 435 Exhibit 163, p. 2.
 436 Exhibit 8, pp. 35–36.
 437 Transcript, November 30, 2010, pp. 114–15.
 438 Exhibit 229, p. 1.
 439 Exhibit 230, pp. 1–2.
 440 Transcript, December 1, 2010, p. 114.
 441 Transcript, November 30, 2010, pp. 96–97.
 442 Exhibit 120.
 443 Transcript, November 30, 2010, p. 115.
 444 Exhibit 121.
 445 Transcript, September 23, 2011, pp. 83–84.
 446 Exhibit 102.
 447 Transcript, December 9, 2010, pp. 25–26.
 448 Exhibit 170, p. 6; Hon. Bryan Williams, *2004 Southern Salmon Fishery Post-Season Review, Part One: Fraser River Sockeye Report* (2005).
 449 Transcript, September 28, 2011, p. 70.
 450 Transcript, September 22, 2011, pp. 45–46.
 451 Transcript, September 22, 2011, p. 46.
 452 Exhibit 245, p. 3.
 453 Transcript, December 9, 2010, p. 13, and December 16, 2010, p. 86.
 454 Exhibit 245, p. 3.
 455 Transcript, December 16, 2010, p. 86.
 456 Transcript, December 8, 2010, p. 56.
 457 Transcript, December 16, 2010, p. 73.
 458 Exhibit 238, p. 10.
 459 Transcript, December 9, 2010, pp. 38–39.
 460 See Exhibits 238 and 240.
 461 Paul Sprout, Transcript, December 9, 2010, p. 25.
 462 Mark Saunders, Transcript, December 8, 2010, p. 93.
 463 Exhibit 238, p. 8; Exhibit 240, pp. 6, 8.
 464 Transcript, December 9, 2010, p. 36.
 465 Transcript, December 8, 2010, p. 93.
 466 Transcript, September 28, 2011, p. 105.
 467 Transcript, June 3, 2011, p. 54. See also Exhibit 956, p. 1.
 468 Exhibit 236, p. 2. See also Exhibits 150 and 151.
 469 Richard Beamish, Transcript, July 7, 2011, p. 56; Brent Hargreaves, Transcript, February 21, 2011, p. 63.
 470 Transcript, June 1, 2011, p. 97.
 471 Transcript, June 1, 2011, p. 98, and June 2, 2011, pp. 59–60.
 472 Transcript, June 1, 2011, pp. 98–99.
 473 Carrie Holt, Transcript, December 7, 2010, pp. 64–65; Heather Stalberg, Transcript, December 8, 2010, p. 22.
 474 Transcript, December 3, 2010, pp. 46–47.
 475 Transcript, December 9, 2010, pp. 37–38. See also Exhibit 238, p. 9.
 476 Transcript, June 2, 2011, pp. 19–20.

- 477 Brian Riddell, Transcript, June 2, 2011, pp. 15–18. See also Karl English, Transcript, April 15, 2011, pp. 54–55, and Heather Stalberg, Transcript, December 8, 2010, pp. 64–65.
- 478 Brian Riddell, Transcript, December 1, 2010, p. 41.
- 479 Exhibit 182, p. 5; Transcript, December 3, 2010, p. 48; Transcript, December 7, 2010, pp. 65–66.
- 480 Transcript, December 7, 2010, p. 69.
- 481 Transcript, December 8, 2010, p. 65.
- 482 Transcript, December 7, 2010, p. 33.
- 483 Transcript, December 8, 2010, pp. 60–61.
- 484 Transcript, December 8, 2010, p. 69.
- 485 Jeff Grout, Transcript, January 21, 2011, p. 71.
- 486 Exhibit 343, p. 1.
- 487 Exhibit 343, p. 1.
- 488 Exhibit 343, p. 2.
- 489 Jeff Grout, Transcript, January 21, 2011, p. 71.
- 490 Exhibit 101, p. 5.
- 491 Exhibit 94, p. 3.
- 492 Exhibit 343, pp. 198–99.
- 493 Jeff Grout, Transcript, January 24, 2011, pp. 15–16. DFO's MSC Action Plan is found within Exhibit 343A (Appendix 6) and is also Exhibit 159.
- 494 Susan Farlinger, Transcript, December 9, 2010, pp. 73–74.
- 495 Mark Saunders, Transcript, December 3, 2010, pp. 36–37.
- 496 Transcript, December 3, 2010, p. 37.
- 497 Exhibit 101, p. 8; Jeff Grout, Transcript, January 24, 2011, p. 16; Exhibit 159, pp. 2–3.
- 498 Exhibit 159.
- 499 Transcript, September 26, 2011, p. 18.
- 500 Exhibit 159, pp. 4–11.
- 501 Susan Farlinger, Transcript, December 9, 2010, p. 77; Rob Morley, Transcript, March 15, 2011, pp. 6–7; Jeffery Young, Transcript, June 1, 2011, p. 101; Brian Riddell, Transcript, June 1, 2011, pp. 100–1.
- 502 Transcript, March 16, 2011, p. 57.
- 503 Transcript, September 26, 2011, pp. 17–18.
- 504 Exhibit 1218, p. 3.
- 505 Exhibit 159, p. 5.
- 506 Exhibit 159, p. 4.
- 507 Transcript, December 9, 2010, pp. 74–75.
- 508 Transcript, September 27, 2011, pp. 20–21.
- 509 Exhibit 159, p. 5.
- 510 Exhibit 159, p. 8.
- 511 Transcript, September 26, 2011, p. 88.
- 512 Transcript, December 3, 2010, p. 37. See also Exhibit 103, p. 6, and Exhibit 183, p. 6.
- 513 Jim Irvine, Transcript, December 3, 2010, pp. 38–39; Exhibit 103, p. 6.
- 514 Exhibit 159, p. 5.
- 515 Transcript, December 3, 2010, p. 39.
- 516 Jeff Grout, Transcript, January 24, 2011, pp. 8, 17–18; Exhibit 159, p. 5.
- 517 Transcript, June 1, 2011, pp. 83 and 95.
- 518 Exhibit 956, p. 2.
- 519 Exhibit 969.
- 520 Transcript, June 3, 2011, pp. 23–24.
- 521 Exhibit 1219, p. 1.
- 522 Transcript, December 3, 2010, p. 37. See also Exhibit 103, p. 6, and Exhibit 183, p. 6.
- 523 Exhibit 969, p. 1; Carrie Holt, December 3, 2010, p. 39.
- 524 Exhibit 1218, p. 2; Exhibit 969; Exhibit 804.
- 525 Exhibit 8, p. 35.
- 526 Exhibit 14, p. 279.
- 527 Exhibit 14, pp. 279–80.
- 528 Exhibit 312, p. 9.
- 529 Transcript, December 9, 2010, p. 24.
- 530 Paul Sprout, Transcript, December 9, 2010, pp. 82–83.
- 531 Exhibit 244, p. 3.
- 532 Exhibit 312, p. 9.
- 533 Transcript, December 9, 2010, pp. 82–84.
- 534 Paul Sprout, Transcript, December 9, 2010, pp. 21–22; Mark Saunders, December 2, 2010, pp. 40–41.
- 535 Transcript, December 16, 2010, pp. 31–32.
- 536 Exhibit 312, p. 9.
- 537 Transcript, December 3, 2010, pp. 68–69.
- 538 Paul Ryall and Mark Saunders, Transcript, June 3, 2011, pp. 26–27.
- 539 Transcript, December 3, 2010, p. 66.
- 540 Exhibit 312, p. 9.
- 541 Transcript, December 8, 2010, p. 21.
- 542 Exhibit 168; Exhibit 963.
- 543 Transcript, December 3, 2010, pp. 66–67.
- 544 Exhibit 963; Exhibit 962, p. 2.
- 545 Exhibit 963, p. 1.
- 546 Transcript, December 2, 2010, pp. 40–41.
- 547 Exhibit 963.
- 548 Transcript, November 29, 2010, p. 73.
- 549 Transcript, September 22, 2011, p. 47.
- 550 Transcript, September 26, 2011, p. 98.
- 551 Transcript, September 23, 2011, pp. 57–58.
- 552 Transcript, December 9, 2010, pp. 20–21.
- 553 Transcript, December 9, 2010, pp. 21–23.
- 554 Transcript, December 9, 2010, p. 24.
- 555 Exhibit 101, p. 8.
- 556 Exhibit 168, p. 1. See also Exhibit 963, p. 2.
- 557 Transcript, December 9, 2010, p. 21.
- 558 Transcript, December 2, 2010, pp. 47–48.
- 559 Transcript, December 3, 2010, p. 66.
- 560 Exhibit 245, p. 2; Paul Sprout, Transcript, December 9, 2010, pp. 22–23.
- 561 Exhibit 963, p. 2.
- 562 Exhibit 238, pp. 1–2.
- 563 Susan Farlinger, Transcript, December 9, 2010, p. 29; Claire Dansereau, Transcript, September 28, 2011, p. 105.
- 564 Susan Farlinger, Transcript, December 9, 2010, p. 28; Claire Dansereau, Transcript, September 23, 2011, p. 54.
- 565 Transcript, December 9, 2010, pp. 30–32.
- 566 Exhibit 312, p. 9.
- 567 Exhibit 245, p. 3. See also Transcript, December 9, 2010, p. 10.
- 568 Transcript, December 7, 2010, pp. 27, 34–35.
- 569 Exhibit 181, p. 6; December 2, 2010, pp. 26–27.
- 570 Transcript, December 9, 2010, pp. 32–33.
- 571 Exhibit 240, p. 13.
- 572 Exhibit 175.
- 573 Heather Stalberg, Transcript, December 3, 2010, p. 4.
- 574 Transcript, December 9, 2010, pp. 12–13.
- 575 Exhibit 971, p. 2.
- 576 Exhibit 951, p. 12.
- 577 Transcript, June 3, 2011, pp. 40–42.
- 578 Exhibit 970, p. 2.
- 579 Transcript, December 8, 2010, p. 21.
- 580 Transcript, December 3, 2010, pp. 53–54; Exhibit 103, p. 6.
- 581 Transcript, December 3, 2010, pp. 55–56.
- 582 Transcript, December 8, 2010, p. 68.
- 583 Exhibit 937, p. 20.
- 584 Transcript, June 2, 2011, pp. 5–6.
- 585 Transcript, June 2, 2011, p. 6.
- 586 Exhibit 965, p. 11.
- 587 Exhibit 199, p. 2.
- 588 Mark Saunders, Transcript, December 2, 2010, pp. 47–48; Claire Dansereau, Transcript, September 26, 2011, pp. 97–98.
- 589 Transcript, November 29, 2010, pp. 73–74.
- 590 Exhibit 103, p. 5; Transcript, December 8, 2010, pp. 58–59.
- 591 Kim Hyatt, Transcript, December 3, 2010, p. 19. See also Dr. Irvine's evidence on Strategy 3 implementation at Exhibit 103, p. 5, and Transcript, December 8, 2010, pp. 58–59.

- 592 Transcript, September 26, 2011, pp. 97-98.
593 Transcript, September 26, 2011, p. 98.
594 Transcript, November 29, 2010, p. 73.
595 Exhibit 100, p. 5.
596 Transcript, December 9, 2010, pp. 85-86.
597 Transcript, December 9, 2010, p. 86.
598 Transcript, December 8, 2010, pp. 20-21. See also Exhibit 103, p. 6.
599 Jim Irvine, Transcript, December 3, 2010, p. 54.
600 Transcript, December 8, 2010, p. 68.
601 Transcript, December 9, 2010, pp. 84-86.
602 Heather Stalberg, Transcript, December 8, 2010, p. 34; Kim Hyatt, Transcript, December 8, 2010, pp. 34-35; Mark Saunders, Transcript, December 3, 2010, pp. 56-57.
603 Transcript, December 3, 2010, pp. 56-57.
604 Transcript, December 8, 2010, p. 35.
605 Transcript, June 1, 2011, pp. 99-100.
606 Transcript, June 2, 2011, pp. 6-7.
607 Transcript, June 2, 2011, p. 7.
608 Transcript, June 3, 2011, p. 50.
609 Transcript, September 23, 2011, p. 55.
610 Paul Ryall, Transcript, June 3, 2011, pp. 8-10.
611 Exhibit 8, p. 25.
612 Exhibit 8, p. 26.
613 Exhibit 8, p. 29.
614 Mark Saunders, Transcript, December 3, 2010, p. 51.
615 Paul Macgillivray, Transcript, November 1, 2010, pp. 90-91.

Chapter 11 • Cultus Lake case history

■ Introduction

My Terms of Reference direct me to investigate the causes for the decline of Fraser River sockeye salmon stocks and their current state as well as the long-term projections for those stocks. In doing so, and in developing recommendations for improving the future sustainability of the fishery, I am cognizant of the fact that Fraser River sockeye salmon are not a single entity but a collection of many different populations, or, in the language of the Wild Salmon Policy (WSP), Conservation Units. Accordingly, where lessons can be drawn from examining in detail the evidence related to management of a specific population by the Department of Fisheries and Oceans (DFO), I am prepared to do so.

The Cultus Lake sockeye salmon population is perhaps the most studied sockeye population in British Columbia. DFO possesses data dating back to the early 1900s; the Soowahlie First Nation has information from much earlier times.¹ Cultus Lake sockeye are genetically differentiated from other sockeye

and exhibit a distinctive life history. For example, they are one of the few sockeye salmon populations to spawn in a lake rather than a stream or a river. The failure of previous attempts to transplant sockeye to Cultus Lake suggests that the population, if lost, may not be replaceable.² This particular sockeye is also significant to the Soowahlie, whose claimed traditional territory includes Cultus Lake.³

Cultus Lake sockeye are a relatively small population of sockeye which inhabit a small lake. Even historical escapements at Cultus Lake of more than 70,000 spawners are dwarfed by those of larger, more productive lakes in the Fraser River basin.⁴ The recent generational (four-year) average is about 1,000 spawners – a small fraction of the population's productive capacity.⁵ DFO scientists have observed declines in both abundance and productivity (the number of adult returns per spawner), and in a 2011 paper they assessed the Cultus Lake sockeye Conservation Unit as having WSP “red zone” status (see Chapter 10, Wild Salmon Policy) for all trends in abundance metrics.⁶ The Commission's Technical

Report 3, Freshwater Ecology, confirmed that the population remained at the highest severity of risk in 2010.⁷ Cultus Lake sockeye are also less productive than other populations grouped into the Late-run timing group.⁸ This decline presents challenges in managing the mixed-stock fishery, as I describe in Chapter 5, Sockeye fishery management.⁹

Over-exploitation, including directed and incidental catches, has been identified as one of the leading causes of the collapse of the Cultus Lake population.¹⁰ According to DFO, exploitation rates exceeded estimated maximum sustainable yield* in most years between 1952 and 1995, frequently by 80 percent and sometimes by 90 percent.¹¹ There is also evidence of other likely contributors,[†] especially in light of reduced harvests in recent years: marine conditions; unusually early adult migration and pre-spawning mortality since 1995; and *Parvicapsula minibicornis* parasite infestation.¹² At our public forum in Chilliwack and through submissions by mail and through our website, I heard many concerns about increasing recreational, residential, and agricultural uses in and around Cultus Lake.¹³ In addition, invasive Eurasian watermilfoil has encroached on the spawning and rearing habitat that sockeye share with a number of natural predators.¹⁴

In this chapter, rather than considering any evidence regarding the causes of the decline, I examine Cultus Lake sockeye as a case study of DFO's practices and procedures relating to the management of a vulnerable Fraser River sockeye salmon population. Cultus Lake sockeye are one of two sockeye populations (the other being Sakinaw Lake sockeye) that have been considered for legal protection under the *Species at Risk Act* (SARA). Ultimately, concerns related to the socio-economic impact of such protection on the Fraser River sockeye fishery prevented their listing. I heard evidence on the issues facing the government during the listing decision process, including questions about whether and how to manage weak stocks, and how to weigh the economic impact of harvest restrictions against the benefits of biodiversity. The SARA listing decision was under consideration while DFO was finalizing the WSP.

I heard evidence on a number of conservation actions that DFO and other dedicated groups and individuals have taken in an attempt to bring Cultus Lake sockeye back from what appeared to be imminent extinction. From these recovery efforts, witnesses told me, we can learn lessons to help our understanding of how DFO, by implementing the WSP, might focus its effort and invest resources to maximize the long-term sustainability of other Conservation Units.¹⁵ The WSP is designed to facilitate taking management actions in advance of biological listing by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and legal listing under SARA, and to prevent salmon species from being extirpated or becoming extinct.¹⁶ It also envisions a process through which the impacts of various biological, social, and economic factors are weighed.¹⁷

Many witnesses mentioned Cultus Lake sockeye in their evidence, which I considered. However, three witnesses from DFO were particularly knowledgeable about the department's management of Cultus Lake sockeye: Neil Schubert, head of the Freshwater Ecosystems Section within the Salmon and Freshwater Ecosystems (SAFE) Division of DFO Science, has been involved with Cultus Lake sockeye recovery activities since 2000 and remains involved today, though his roles and titles have changed over the years; Dr. Michael Bradford, research scientist in SAFE and adjunct professor at Simon Fraser University, has worked in Cultus Lake sockeye recovery since 2003; and Dr. John Davis is the former special advisor to the deputy minister on species at risk, having joined DFO as a research scientist in 1971.[‡]

■ DFO's advice not to list Cultus Lake sockeye under SARA

Background

In the late 1990s, DFO staff working near Cultus Lake became aware that Cultus sockeye had

* Maximum sustainable yield is the maximum production of recruits per spawner. See Chapter 5, Sockeye fishery management.

† I make findings related to the causes of the long-term decline and the 2009 collapse of sockeye salmon in Volume 2, Causes of the Decline.

‡ More information about these witnesses' backgrounds can be found in Exhibits 911, 912, and 884, respectively.

declined to a critical point and were experiencing high pre-spawning mortality. A joint effort between the Stó:lō Nation and DFO to repair an enumeration fence on the Sweltzer Creek migratory corridor brought increased attention to the Cultus Lake sockeye population. As Mr. Schubert summarized in his testimony, “starting in the 2000s there was a growing awareness that we had a major conservation issue.”¹⁸ DFO staff took preliminary actions to address the problem, as I describe later in this chapter.

In September 2002, biologist Ken Wilson and Chief Doug Kelly of the Soowahlie First Nation wrote to COSEWIC to request an emergency assessment* of Cultus Lake sockeye salmon.¹⁹ They based their request in part on a 2002 Canadian Science Advisory Secretariat (CSAS) paper authored by Mr. Schubert and others reporting on the status of Cultus Lake sockeye salmon.²⁰

COSEWIC was created in 1977 to provide a scientifically sound, national listing of wildlife species at risk. The committee of experts determines the national status of wild species, subspecies, varieties, and populations that are considered to be at risk in Canada.²¹

In late 2002, COSEWIC asked Mr. Schubert to write the assessment and status report on the Cultus Lake population (the COSEWIC Status Report), which he completed in May 2003. It is, apparently, not unusual for COSEWIC to collaborate with DFO scientists.²² The report observed declines from 1991 to 2002 in adult spawner population (36 percent) and in total reproductive potential (92 percent).²³ It also confirmed the “endangered” status of the Cultus Lake population – in other words, that the population faced imminent extirpation or extinction.²⁴ The COSEWIC Status Report referred to what could result from the WSP, which was then in draft form, anticipating that, “[a]fter implementation, it will provide additional protection to genetically distinct populations or groups of populations designated as conservation units.”²⁵

Dr. Davis testified that DFO did not disagree with COSEWIC’s assessment, which was based on the work of DFO scientists. Similarly, Mr. Schubert

told me he did not encounter disagreement from senior managers at DFO.²⁶ On April 21, 2004, the Government of Canada released a statement outlining its response to and summarizing the COSEWIC assessment:

The Cultus population has unique genetic and biological characteristics (migratory delay of adults at the Fraser estuary, protracted lake residency before spawning, exclusive lake spawning, late spawning date, deepwater life of fry). The lack of success with previous attempts to transplant sockeye to Cultus Lake and other lakes, suggests that Cultus sockeye are irreplaceable. The Cultus population has collapsed primarily due to overexploitation, including directed and incidental catches in mixed-stock fisheries at levels above those that can be sustained. An additional key source of impact on spawning adults since 1995 has been very high pre-spawn mortality, associated with unusually early migration into freshwater and with *Parvicapsula* parasite infestation. There are also ecological impacts to the lake habitat from colonization by Eurasian Watermilfoil, land development, stream channelization, nutrient input, and recreational use. Under present conditions, there is a high probability of extinction of the Cultus sockeye.²⁷

In late May 2003, shortly after the release of the COSEWIC assessment, the regional director general of DFO’s Pacific Region approved the formation of the Salmon Recovery Steering Committee.²⁸ Because it predated the full coming into force of SARA, the committee was authorized to form what Mr. Schubert described as “a kind of pre-SARA” recovery team for Cultus Lake sockeye as well as separate recovery teams for Sakinaw Lake sockeye and Interior Region coho.²⁹

Mr. Schubert agreed to chair the Cultus Sockeye Recovery Team (the recovery team), which first met in November 2003. He explained that the recovery team was multi-sectoral, with members from the commercial and sport

* Section 28(1) of SARA provides that any person who considers that there is an imminent threat to the survival of a wildlife species may apply to COSEWIC for an assessment of the threat for the purpose of having the species listed on an emergency basis under s. 29(1) as an endangered species.

fisheries, First Nations, the Pacific Salmon Commission, environmental groups, provincial and local governments, and a core group of DFO staff.³⁰ Its major objective was to draft a recovery strategy* that would be compliant with SARA.³¹ Mr. Schubert testified that the process was challenging because of the short time frame and the diversity of interests and backgrounds represented on the recovery team. He was initially apprehensive about the process but now believes the consensus approach was essential to their success: “You can’t have ... an effective recovery team if everyone doesn’t buy into the conclusions and decisions of the team ... And I think there was a mutual respect ... that came from working in the consensus-based environment and realizing that other team members are wanting to make compromises in order to come to agreement.”³² Mr. Schubert and Dr. Bradford agreed that both local knowledge, including Aboriginal traditional knowledge, and regional awareness are critical parts of the planning process (see also the discussion of DFO’s use of Aboriginal traditional knowledge in Chapter 4, DFO overview³³). The recovery team met several times in 2004 and produced a draft recovery strategy.³⁴

DFO advises against emergency SARA listing

SARA provides Canada’s legal framework for the protection of wildlife species at risk (see also Chapter 3, Legal framework). It came into force in large part on June 5, 2003, and fully on June 1, 2004.³⁵ SARA specifies the process for designating wildlife species “at risk” by listing them on the List of Wildlife Species at Risk set out in Schedule 1 (the list).[†]

SARA was recognized by DFO as providing stronger protection for wildlife species at risk as well as a degree of transparency and accountability not included in the *Fisheries Act* or other existing

legislation.³⁶ It has also been recognized by the Federal Court as providing listed species with compulsory legal protection not subject to dilution through discretionary ministerial action.³⁷ For listed aquatic species, SARA requires the minister of fisheries and oceans to develop recovery strategies, management plans, and action plans within specified timelines to identify and protect the critical habitat of listed endangered, threatened, and in some cases extirpated species being reintroduced. The minister must also satisfy various co-operation, consultation, and reporting requirements within specified timelines.

Any recommendation to the Governor in Council to list or not list a species assessed by COSEWIC must come from the minister of environment. Before making such a recommendation, the minister must consult certain other ministers. For aquatic species, the minister of fisheries and oceans must be consulted.³⁸

Under normal circumstances, after receiving a status assessment from COSEWIC, the Governor in Council has nine months to review it and to make a decision.³⁹ However, if the minister of environment believes there is an “imminent threat” to the survival of a wildlife species, the minister must, after consultation with other ministers, recommend to the Governor in Council that the species in question be added to the list on an emergency basis.⁴⁰

In December 2003, COSEWIC requested an emergency listing for the Cultus and Sakinaw sockeye populations.⁴¹ This request was the first for an emergency listing, and the first sockeye salmon populations proposed for listing.⁴²

DFO’s opposition to the emergency listing request is shown in a draft memorandum for the minister of fisheries and oceans⁴³ and in a briefing deck presented to the minister of environment.⁴⁴ The draft memorandum advises that the minister of environment may consider only biological factors, and not socio-economic factors, in deciding whether to recommend to cabinet that a species be listed on an emergency basis. DFO told the minister of

* A recovery strategy is a species-specific document that meets a number of specifications set out in SARA, including identification of the species’ critical habitat to the extent possible. *Species at Risk Act*, SC 2002, c. 29, s. 41(1).

† “Wildlife species” under SARA means, in simple terms, a species, subspecies, or geographically or genetically distinct population. COSEWIC deemed Cultus Lake sockeye a genetically distinct population (Exhibit 913, p. 6). DFO considers Cultus Lake sockeye a distinct Conservation Unit under the WSP. Salmon Conservation Units are, as much as practicable, aligned with wildlife species under SARA (Jim Irvine, Transcript, November 30, 2010, pp. 18–19).

environment that it would put mitigation measures in place to remove the imminent threat of extirpation and thus avoid an emergency listing.⁴⁵ Once that was done, the normal listing process would continue. There would then be the opportunity to consult further, for the minister of environment to factor socio-economic considerations into a recommendation, and “ultimately for him to consider a recommendation not to list.”⁴⁶

On or about April 21, 2004, the minister of environment announced his decision not to recommend the listing of Cultus and Sakinaw sockeye under SARA on an emergency basis. Rather, the two populations would go through the normal listing process.⁴⁷ In the meantime, DFO would address any “imminent threats” to the populations through fisheries management, habitat restoration, broodstock recapture, and enhancement.⁴⁸ Specifically, the harvest rate would be limited to 10–12 percent; Eurasian watermilfoil would be removed; predator control would be considered; and further evaluation of habitat restoration needs would be undertaken.⁴⁹ DFO reiterated these commitments in a question-and-answer sheet.⁵⁰ I discuss the department’s implementation of recovery measures later in this chapter.

Consultations on listing Cultus Lake sockeye

Under the normal, non-emergency listing process, SARA allows nine months after the Governor in Council receives the COSEWIC assessment before the council must decide whether to list the species, not list the species, or refer the matter back to COSEWIC.⁵¹ During this nine-month period for Cultus Lake sockeye, over the spring and early summer of 2004, DFO held a number of consultations throughout the Pacific Region to seek input from First Nations, governments, and various interest groups on the proposed SARA listings.⁵² Recovery team members attended these consultations and provided presentations on their draft recovery strategy and on their conclusions and recommendations.⁵³ Only one meeting took place near Cultus Lake, in Chilliwack.⁵⁴

Referring to the recovery team meeting minutes, which Mr. Schubert said accurately reflected members’ experiences, “[M]ost of the comments were negative. Very few First Nations people attended the sessions. Few participants had read the recovery strategies, so a lot of the feedback ... wasn’t informed by the recovery strategy.”⁵⁵ Mr. Schubert noted that, because the consultations involved not only the salmon species but also a number of other species proposed for listing, the impact was diluted. He offered his opinion that, although these consultation sessions were necessary, the most useful discussions had taken place near Cultus Lake and had focused on Cultus Lake sockeye.⁵⁶

A summary of consultations with First Nations prepared by DFO staff shows that the people at these meetings expressed a variety of concerns about the process, including how the impact of various socio-economic effects would be assessed.⁵⁷

Socio-economic analysis

One of the key questions facing DFO during the consultation period was, “What would be the implications of listing from the standpoint of weak stocks that are part of mixed stock fisheries?”⁵⁸ In other words, what were the potential social and economic costs and benefits of listing Cultus and Sakinaw sockeye? To address this question, DFO’s Policy Branch, Pacific Region and external consultants produced a number of socio-economic reports and presentations that became evidence for this Commission.*

One of the main conclusions to come out of these reports was an anticipated cost of listing of \$125 million in lost revenue over four years, reflecting the fact that DFO anticipated “no marine commercial fishery on Fraser River sockeye salmon” in three of the four years from 2004 to 2007.⁵⁹ The \$125 million figure included the First Nations’ harvest for food, social, or ceremonial (FSC) purposes, the commercial harvest, recreational fishing, and the fish-processing value.⁶⁰

DFO accepted the conclusions of the socio-economic reports and reiterated them in a number of memoranda. For example, a September 13, 2004, memorandum to the minister cites the \$125 million

* See Exhibits 891, 892, 892A, 892B, 892C, 892D, 892E, and 892F. I note that some of these documents appear to be draft versions and “framework” documents.

figure and concludes that “[t]he socioeconomic impact threatens the viability of the entire salmon industry in southern BC.”⁶¹ This memorandum recommends against SARA listing for both Cultus and Sakinaw sockeye.

I heard extensive testimony on the shortcomings of the socio-economic analysis, and I reviewed documentary evidence summarizing the views of the recovery team, economists, and environmental non-governmental organizations (ENGOS). To highlight areas where DFO might improve future attempts at socio-economic analysis for Fraser River sockeye stocks, I catalogue the criticisms here, beginning with those that were more substantive in nature and concluding with those that were more procedural.

Assumption that listing equated to a complete closure of the fishery. In contrast to the September 13, 2004, memorandum, which suggested that exploitation rates would need to be “essentially zero” and that this goal would result in widespread closures in the South Coast commercial sockeye fisheries, Dr. Bradford took the view that listing did not necessarily mean a prohibition of fishing. Mr. Schubert concurred, stating:

[From d]iscussions amongst the team, we had felt that a listing would not necessarily require complete fisheries closures but that some level of harvest could be allowed through recovery provided we met the minimum population goal and the population growth objectives. So we felt that was more draconian than it should have been.⁶²

An analysis conducted by Sierra Club Canada supports the witnesses’ views that the potential remained for a limited harvest of Cultus Lake sockeye, noting that SARA provides for incidental harm permits as well as harvests consistent with recovery strategies.⁶³ In addition, the analysis argues that there are opportunities for more selective fishing.

Failure to consider cycle-specific issues and the unpredictability of the Fraser River sockeye fishery. Mr. Schubert explained that Fraser River sockeye salmon generally follow a four-year cycle of abundance and that, in two of every four years, the Adams Lake and other Late-run sockeye stocks

are relatively weak and have to be harvested at reduced levels. As a result, the Cultus Lake sockeye, which traditionally migrate late, would likely have benefited from harvest restrictions in two out of every four years whether they were listed or not. For this reason, the socio-economic analysis should not have attributed the costs for those two years to the listing of Cultus Lake sockeye.⁶⁴ Mr. Schubert testified that, in his and the recovery team’s opinion, if the analysis had considered cycle-specific issues, the estimated forgone revenue would have been reduced.⁶⁵

Mr. Schubert also said that, in 2004, the Late-run timing group of sockeye salmon collapsed, meaning that harvest targets would have had to be reduced regardless of the Cultus Lake population:

I don’t think it was until about 2004 that separate exploitation rate targets were established for a Late Run versus Cultus, but when that had occurred, in at least a couple of those years, the difference between what was required for the Late Run and what was required for Cultus were quite trivial; they were 3 percent. So the reduction of exploitation rates from what they used to be at a level of 40, 50 percent or greater down to 12 percent, was being attributed to Cultus when, in fact, the reduction to 15 percent was what was required for those Late Run populations and the impact of Cultus was a further 3 percent on that. So we felt it inappropriate that all of those costs be attributed to the recovery of Cultus.⁶⁶

Some of the socio-economic analysis preceded DFO’s awareness of the 2004 cycle Fraser River sockeye collapse, which may not have developed until September of that year.⁶⁷ However, the collapse and recent variability in returns serves to illustrate how the uncertainty inherent in biological predictions can compound the uncertainty in economic projections for industries exploiting biological systems.

Conflating the impact of Sakinaw and Cultus sockeye listings. For the most part, the socio-economic analysis grouped Sakinaw and Cultus sockeye together, as if listing one population and not the other was not an option. Mr. Schubert explained that “Sakinaw had declined to a virtually extinct level already, and the decision regarding Sakinaw

might have been different [from] the decision regarding Cultus which, at that point, appeared to be imminently recoverable.”⁶⁸

Failure to extend the analysis beyond a four-year period. Mr. Schubert explained that he and the recovery team felt that most of the significant costs of listing would occur in the first four years, whereas the benefits from recovery actions would not begin to accrue until the end of that period. Predator removal, captive breeding, and hatchery supplementation would not be expected to show any benefit “until four or five years in the future, and then building rapidly beyond that.”⁶⁹ Instead, Dr. Bradford agreed, a longer outlook is required. He cautioned, however, that the further one tries to forecast, the more unreliable the prediction becomes.⁷⁰ Who, in 2004, would have predicted the social and economic benefits of the record 2010 return of sockeye salmon?

Failure to consider benefits adequately. Dr. Bradford, in a 2004 email, identified a failure of the socio-economic analysis to consider the benefits of reduced fishing rates, noting, “The analysis does not account for the potential for rebuilding runs that will occur if restrictions are imposed, which could lead to larger catches in the future.”⁷¹ Those runs would include not only Cultus Lake sockeye but co-migrating populations as well.* Some documents show that DFO was, in fact, aware of the potential for reduced exploitation to rebuild runs.⁷² I also heard and reviewed opinions that the analysis did not sufficiently consider benefits to local First Nations whose cultures and livelihoods depend on sockeye salmon, benefits derived from the contribution that Cultus Lake sockeye bring to the ecosystem, and benefits derived from continued scientific study of this unique sockeye population.⁷³

The recovery team also criticized the analysis for failing to consider the potential for listing to increase in-river escapements, allowing more harvest for upstream First Nations that had not been able to harvest their FSC allotment in recent years.⁷⁴ One external report went as far as to say that the socio-economic analysis was not a true cost-benefit analysis because it did not consider the benefits: “Since all projects are costly, if we consider only costs, all projects must fail.”⁷⁵

A draft memorandum from the associate deputy minister to the SARA Secretariat lists a number of potential benefits associated with listing Cultus Lake sockeye, including some of those cited above. It appears, then, that DFO officials were at least aware that listing could bring benefits beyond protection of the Cultus Lake population.⁷⁶

Failure to consider non-traditional fishing options. Mr. Schubert explained that the socio-economic analysis did not identify non-traditional fishing opportunities, such as harvesting in isolation of Cultus Lake sockeye by fishing farther up the Fraser River or harvesting earlier in the season.⁷⁷ As a result, Mr. Schubert and colleagues suggest the impact on the various fisheries is overstated.⁷⁸

Failure to consider the social impact adequately. I heard evidence that, although the analysis was referred to as a socio-economic analysis, it became largely “financial” in nature and did not adequately consider the social implications. Dr. Davis briefly testified on the difficulty in quantifying the value of fish used for food, social, and ceremonial purposes.⁷⁹

In addition to the more substantive criticisms above, I also heard evidence on the process through which DFO conducted, shared, and used the socio-economic analyses. The evidence suggests a number of procedural shortcomings.

Documents were not brought to the attention of the recovery team members until requested. Some witnesses expressed concerns with the transparency of the process and the responsiveness of DFO Policy and Fisheries Management staff. When Mr. Schubert requested an opportunity for members of the recovery team to review the socio-economic analyses, DFO obliged, but allowed only the DFO members, rather than the full team, to review certain documents. He was never informed of the reasons why certain documents had to be kept confidential.⁸⁰ Mr. Schubert said that he received permission to give the recovery team the socio-economic information on November 15, 2004, after the minister of fisheries and oceans had concurred on October 20 to recommend against

* Other witnesses suggested that this approach does not work. See Chapter 5, Sockeye fishery management.

listing and after pre-publication of the recommendation from the minister of environment in the *Canada Gazette*, Part I, on October 23.⁸¹ In fact, the record of a Regional Management Committee meeting attended by Dr. Davis shows that DFO officials had decided to recommend against listing Cultus and Sakinaw sockeye by August 17, 2004.⁸² Mr. Schubert testified that it would have been preferable for DFO to have shared the reports with the full recovery team as soon as they were prepared.⁸³

Because the recovery team was not given an opportunity to review the socio-economic analyses early in the process, the uncertainties inherent in biological predictions that underpin the socio-economic analysis were not taken into account. As a result, the economic uncertainties in terms of expected catch and revenues were magnified. Dr. Bradford explained: “[T]he economic analysis didn’t consider uncertainties in its analysis; it ... just ... came up with a single number, if you like, for all of our biological work that carried that uncertainty forward.”⁸⁴

A letter from Mr. Schubert on behalf of the recovery team and addressed to Paul Macgillivray, acting regional director general, Pacific Region, summarized their concerns:

The Team has concerns about how biological modelling was used to estimate the economic impacts of listing Cultus sockeye. This is an obvious area of competence of the Team given its scientific and technical expertise on this species, as well as its detailed knowledge of the recovery goals and objectives and the actions that are planned or underway to achieve them. The Team has developed a peer reviewed biological model designed to evaluate the response of the population under differing recovery options that include a full spectrum of environmental and management scenarios. In our view, the failure to engage the expertise of the Team in the biological modelling has resulted in significant shortcomings in the socio-economic analysis.⁸⁵

No peer review. The scientific analysis of the status and recovery potential of Cultus Lake sockeye was peer reviewed by both the Pacific Scientific Advice Review Committee (PSARC) and

COSEWIC and then made public. In contrast, the socio-economic analysis documents were not peer reviewed.⁸⁶

Documents were not brought to the attention of First Nations in a timely manner. According to an email from Dr. Davis summarizing a meeting he had with local First Nations, they took the position that the failure to share information was an infringement of their Aboriginal rights.⁸⁷

I heard from participants and witnesses alike that DFO must find a way to conduct socio-economic impact analysis earlier; share the analysis more broadly, especially with First Nations; seek feedback; and consider the results along with COSEWIC advice.⁸⁸

The recovery team made the following recommendation in its letter to Mr. Macgillivray:

[T]he process for providing socio-economic advice for the recovery of COSEWIC-designated species needs to be reconsidered. Carefully considered action plans need first to be developed before an informed socio-economic analysis can be completed. Recovery teams and their implementation groups should be engaged early to ensure consistency with strategy goals and objectives and with recovery actions that are planned or underway. Socio-economic analyses should also undergo the same level of oversight as recovery strategies and action plans, with full peer review and public consultation processes that provide adequate time for sober consideration and written feedback.⁸⁹

David Bevan, associate deputy minister, testified that, at the time, DFO expected these criticisms. He said that, in order to allow the minister of environment to come to a reasonable determination, it was important for the socio-economic analysis to provide a ballpark estimate of the impact that listing Cultus and Sakinaw sockeye would have on the economics of the fishery and on other activities in British Columbia.⁹⁰ Susan Farlinger, regional director general, Pacific Region, added that DFO has recently expanded its capacity to conduct economic analysis by increasing the number of economists within its Regional Policy Branch, although it still lacks capacity to conduct the social components of the analysis.⁹¹

DFO advises against SARA listing

Over the summer of 2004, DFO regional and national headquarters officials met to reach agreement and to brief the minister on DFO's position with respect to listing Cultus and Sakinaw sockeye.⁹² A series of memoranda prepared by DFO regional staff tracks what appears to be the evolution of DFO's view on the proposed SARA listings.⁹³ The June 30, 2004, draft memorandum recommends that Cultus Lake sockeye should be listed under SARA.⁹⁴ The July 20, 2004, draft memorandum leaves the listing recommendation "[t]o be determined."⁹⁵ The August 18, 2004, draft memorandum, which is the most comprehensive, recommends against listing.⁹⁶

A final memorandum for the minister of fisheries and oceans, dated September 13, 2004, and signed by Minister Geoff Regan on October 20, 2004, shows the minister's intention to recommend against SARA listing of Cultus and Sakinaw sockeye and to raise the matter with the minister of environment.⁹⁷ When this memorandum was written, the WSP was in draft. Annex 1 of the memorandum notes that a primary goal of the WSP is to provide guidance "on the tradeoffs between protecting small components of salmon diversity and maintaining a viable mixed-stock fishery."⁹⁸ This policy, according to the annex, will assist in making strategic decisions on listing of small populations under SARA. Another memorandum from Mr. Bevan to Mr. Macgillivray and dated September 17, 2004, states that, when the decision not to list Cultus Lake sockeye under SARA is announced, DFO "will need to set out a plan for the management ... in line with an exploitation rate of 10–12%. One of the underpinnings of our non-listing rationale and our communication strategy is the department's commitment to continue efforts to protect the two populations."⁹⁹

Canada's decision not to list Cultus Lake sockeye under SARA was published in the *Canada Gazette*, Part II, on January 26, 2005.¹⁰⁰ The decision notes that it takes into account public input from more than 50 responses, including submissions from the Sierra Club, British Columbia Aboriginal Fisheries Commission, Soowahlie First Nation, and many individuals and associations from the fishing industry.¹⁰¹

The regulatory impact analysis statement (RIAS) explains the decision:

The Cultus and Sakinaw populations of Pacific sockeye salmon are not added to Schedule 1 because of the unacceptably high social and economic costs that the commercial fishing and recreational fishing sectors, some Aboriginal peoples, coastal communities and others would face if these species were added to Schedule 1. Although the overall health and resiliency of Pacific sockeye salmon is dependent on its overall genetic diversity, of which these two populations are a component, these two populations represent a small fraction of one percent of all BC sockeye salmon populations.¹⁰²

Canada published a separate order giving notice of its decision not to list certain species, including Cultus and Sakinaw sockeye.¹⁰³ The order relied on the DFO financial analysis, citing the \$125 million figure and stating that, if the populations were listed, "there would likely be no marine commercial fishery on Fraser River sockeye salmon in three of [the] four years" and that the food, social, and ceremonial fishing requirements of many First Nations that harvest in marine areas would likely not be achieved.¹⁰⁴

The RIAS expressly committed DFO to ongoing and future actions:

Recognizing that harvesting by the fisheries has been identified as one of the key threats to these populations, and given their precarious status, continued fishing will pose an ongoing threat to these two populations. However, Fisheries and Oceans Canada will continue to implement a departmental action plan for the protection and recovery of these populations, including a continuation of stringent fishery restrictions and habitat restoration and broodstock protection programs. Recovery strategies for the two populations are under development. These will be completed in 2005, and will be used to guide future recovery efforts.¹⁰⁵

DFO's opinion, expressed in a 2005 memorandum with which Paul Sprout, then the regional director general, concurred that completion of the Cultus Sockeye Recovery Strategy did "not constitute a commitment to implement all of the recovery strategies nor are there any legal requirements as there would have been for a SARA recovery strategy."¹⁰⁶

Recovery team is disbanded

Mr. Schubert explained that the recovery strategy was, over time, transformed into a conservation strategy and released in late 2009. The recovery team, chaired by Mr. Schubert and established in late 2003, developed a recovery strategy that set goals and objectives consistent with SARA, as directed by its terms of reference.¹⁰⁷ By December 2004, the draft recovery strategy had gone through public consultation and was undergoing a final edit. However, when Canada made the decision not to list Cultus Lake sockeye, the recovery team was required to remove all references to SARA from the recovery strategy. The recovery team submitted a revised recovery strategy, which Don Radford, acting director, Fisheries Management, acknowledged in the summer of 2005.¹⁰⁸ In April 2006, the regional director general approved the recovery strategy and sent it to Ottawa for review and approval. DFO officials in Ottawa required further changes, such as removing the terms “recovery” and “critical habitat” and renaming the document a “Conservation Strategy.”¹⁰⁹ By mid-2008 it was posted online but was found to contain formatting and other errors. Finally, around November 2009, more than four years after the drafting process began, the document was reformatted as a citable work – a fisheries and aquatic sciences technical series report.¹¹⁰ The substantive content, including the goals, objectives, and approaches, remained largely unchanged from the 2005 version.¹¹¹

A number of events occurred between the completion of the first draft of the recovery strategy and the posting of the conservation strategy. In April 2005, Mr. Schubert received a letter, along with other materials, from Mr. Radford’s office responding to the recovery team’s letter raising concerns about the socio-economic analysis.¹¹² The materials announced the disbanding of the recovery team.¹¹³

The April 2005 package also committed ongoing funding for recovery efforts and set out a process to replace the work of the recovery team. A note from Mr. Radford’s office confirmed DFO’s commitment to implement recovery actions and to fund recovery work in 2005/6 at a level similar

to that during the previous two years.¹¹⁴ The Integrated Fisheries Management Plan (IFMP) was to be informed by the recovery strategy (see Chapter 5, Sockeye fishery management, for details). The area offices were to appoint coordinators and develop project timelines.¹¹⁵ However, Mr. Schubert testified that no subsequent action occurred at the area level.¹¹⁶

In an April 19, 2006, letter, the Marine Conservation Caucus expressed concerns to the Integrated Harvest Planning Committee (IHPC) over the disbanding of the recovery team and the lack of either an action plan or an implementation team.¹¹⁷ Specifically, the letter suggests that the disbanding of the recovery team means the loss of the expertise and independence necessary to assist the IHPC in evaluating alternative harvest strategies or enhancement measures.¹¹⁸

A Regional Management Committee decision paper prepared for a July 25, 2006, meeting illustrates that DFO was grappling with lingering questions related to SARA implementation and protection of non-listed species (see Chapter 4, DFO overview).¹¹⁹ It notes the lack of any process for species not listed for socio-economic reasons, and it questions whether recovery strategies and action plans should be completed in advance of a final listing decision, or at all, and whether recovery teams should remain in place. It also observes issues stemming from a lack of coordination where recovery teams have disbanded after a decision not to list a species or population under SARA:

In some cases, there seems to be a continued need for species leads as well as a need to develop SARA-like action plans to clearly identify the way forward; to show regional commitment to conservation, protection and recovery; to identify priorities; to provide direction for staff; and to ensure consistency in regional approaches to recovery.¹²⁰

The 2006 decision paper recommends, among other things, developing SARA-like action plans for Sakinaw and Cultus sockeye salmon.* “These plans

* SARA requires ministers responsible for a recovery strategy to prepare an action plan based on the recovery strategy. It sets out a number of content requirements, including the identification of critical habitat to the extent possible and a statement of the measures proposed to protect the species’ critical habitat. It also calls for evaluation of the socio-economic costs of the action plan and the benefits to be derived from its implementation. *Species at Risk Act*, SC 2002, c. 29, ss. 47, 49.

would include prioritized activities for implementation, start dates and estimated costs. They would not include other SARA requirements such as critical habitat identification and [socio-economic] evaluations due to workload and resource capacity considerations.”¹²¹

In 2007, Mr. Schubert agreed to chair a Cultus Sockeye Conservation Team (conservation team) formed “to fill a void which had become obvious in recovery planning for Cultus sockeye, three or four years after the Recovery Team had disbanded.”¹²² He explained that the main difference between this team and the recovery team was its exclusion of non-DFO members.

Mr. Sprout concurred with a May 2008 memorandum stating that a process to implement the Cultus Lake sockeye conservation strategy and other conservation strategies had not been formalized.¹²³ Further, a regional strategy for implementing recovery activities for non-listed species remained outstanding. By this time, DFO had established the conservation team.¹²⁴ Mr. Schubert testified that part of its mandate was to develop an implementation plan for the conservation strategy, although, at the time he testified before the Commission, no such plan had been developed because the conservation team had not received the resources to do so.¹²⁵

■ Cultus Lake sockeye recovery measures

Mr. Schubert agreed that the conservation strategy is, in essence, a biological document. It does not engage in any socio-economic analysis or trade-offs between conservation and socio-economics.¹²⁶ While the conservation strategy itself was not peer reviewed, Dr. Bradford and Mr. Schubert testified that the scientific bases for its goals and objectives were the subject of a detailed technical review by Dr. Bradford and a colleague. The results of this technical review were published in a peer reviewed paper.¹²⁷ The conservation strategy’s overarching goal is “to halt the decline of the Cultus sockeye population and return it to the status of a viable, self-sustaining and genetically robust wild population that will contribute

to its ecosystems and have the potential to support sustainable use.”¹²⁸ Dr. Bradford testified that, when the precursor recovery strategy was under development, the population was nowhere near that goal. He explained that the recovery team therefore “developed a sequential or hierarchical set of objectives ... kind of like taking the patient from the ambulance to the emergency room, to the hospital ward, and finally being discharged.”¹²⁹

There are four sequential objectives under the conservation strategy’s overarching conservation goal. They are to

- 1 ensure the genetic integrity of the population by exceeding a four-year arithmetic mean of 1,000 successful adult spawners with no fewer than 500 successful adult spawners on any one cycle;
- 2 ensure growth of the successful adult spawner population for each generation and each cycle for not less than three out of four consecutive years;
- 3 rebuild the population to the level of abundance at which it can be delisted by COSEWIC; and
- 4 rebuild the population to a level of abundance that will support ecosystem function and sustainable use.¹³⁰

I heard evidence on a number of DFO-led or -supported activities that were intended to promote Cultus Lake sockeye recovery. These recovery activities could be described generally as aimed at meeting the conservation objectives in the conservation strategy. However, no implementation plan or action plan exists that sets out the measures to be taken to implement the recovery strategy and achieve its objectives, and that provides an indication of when the measures should take place.¹³¹ Had Cultus Lake sockeye been listed under SARA, development of an action plan would have been mandatory. Instead, recovery efforts have been sporadic. I summarize below the evidence relating to harvest restrictions and enhancement efforts, and also to activities that address the three primary freshwater threats: predation by pikeminnow, watermilfoil encroachment, and anthropogenic (or human) impact.

Harvest restrictions

Mr. Schubert was asked whether harvest control measures fall within the suite of recovery programs for Cultus Lake sockeye. He testified that exploitation rate control is one of the approaches to recovering a sockeye population, but that the conservation team does not advise fisheries management:

We don't directly advise fisheries management on explicit exploitation rates in any given year, but we do, I guess, expect them to be set within the terms of the objectives of the Recovery Team, which will allow the minimum escapement and cycle over cycle growth, and in the future I think the achievement of the lower and upper benchmarks that have been set out provisionally under Wild Salmon Policy.*

In October 2005, Mr. Sprout directed that the advice from the recovery strategies for Cultus and Sakinaw sockeye be incorporated into the IFMP for salmon.¹³² Mr. Radford similarly advised the recovery team, following the decision not to protect Cultus Lake sockeye under SARA, that recovery “is expected to be implemented through the [IFMP] process. The development of the IFMP will be informed by the recovery strategy.”¹³³

The draft 2011–12 IFMP for salmon in southern British Columbia is the first instance of an IFMP explicitly including the conservation objectives from the Cultus Sockeye Conservation Strategy.[†] Paul Ryall, former lead, Salmon Team, in DFO's Fisheries and Aquaculture Management Branch, testified that exploitation limits for Cultus Lake sockeye have been in place in IFMPs since around 2004, although the management actions have not been consistent. He also explained, referring to the draft 2011–12 IFMP for salmon, that in-season adjustments to the exploitation rate need to be consistent with the conservation objectives in the conservation strategy.¹³⁴ I heard similar evidence from Barry Rosenberger, area director, BC Interior, DFO, and Canadian chair

of the Fraser River Panel of the Pacific Salmon Commission, who testified that fishing rules for the Late-run stocks are set for what Cultus Lake sockeye can sustain.¹³⁵

Dr. Bradford and Mr. Schubert testified that the recovery team and the conservation team have never identified to fisheries managers the number of spawners or the escapement level necessary to avoid COSEWIC endangered status (corresponding to objective three of the recovery strategy, and similar to a WSP lower benchmark). Nor have they provided a long-term sustainable use plan (corresponding to objective four, similar to a WSP upper benchmark, which is explained below). The team members felt that, with their divergent interests, they would not be able to arrive at a definitive number, so they did not attempt to do so or to recommend any particular method to achieve that end.¹³⁶ A recent paper by DFO scientists calculates a lower benchmark estimate of 12,000 spawners and a range of 9,000–17,000.¹³⁷ The Fraser River Sockeye Spawning Initiative (FRSSI) process uses a lower benchmark of 7,300 spawners (for an explanation of FRSSI, see Chapter 5, Sockeye fishery management).¹³⁸

In 2010, Dr. Bradford and colleagues published a CSAS research document entitled “Status of Cultus Lake Sockeye Salmon” (the Bradford paper).¹³⁹ It reviews the efficacy of some of the recovery measures that have been implemented. Dr. Bradford agreed in testimony that this document primarily assesses the effectiveness of the enhancement and predator control programs rather than harvest management decisions.¹⁴⁰ Cultus Lake sockeye exploitation rates have decreased in the last decade. Recent allowable and actual exploitation rates are shown in Table 1.11.1.

The Bradford paper notes that the average exploitation rate from 2003 to 2009 was estimated at 17 percent, compared to the historical estimated average of 67 percent.¹⁴¹ The reductions have not been as great as DFO initially proposed: in every year since 2006, the allowable Cultus Lake exploitation rate has exceeded DFO's initial intended limit

* Transcript, May 31, 2011, p. 56. For further explanation of how WSP benchmarks are intended to inform fisheries management decisions, see Chapter 10, Wild Salmon Policy.

† Exhibit 946, pp. 48–49; Paul Ryall, Transcript, June 2, 2011, p. 96, and June 3, pp. 103–4. The 2010–11 IFMP (Exhibit 445) provides a URL for the Cultus Sockeye Conservation Strategy and mentions ongoing recovery measures.

of 10–12 percent.¹⁴² The actual exploitation rate has exceeded 12 percent in all but two years since 2004 (on actual and allowable exploitation rates, see Table 1.11.1, note a).¹⁴³ Overall, however, Cultus Lake sockeye exploitation rates have been considerably reduced from pre-2004 levels.

Table 1.11.1 Cultus Lake sockeye exploitation rates, 2004–10

Year	Allowable rate ^a (%)	Actual rate ^b (%)
2004	10–12	26
2005	10–12	12
2006	30	24
2007	20	16
2008	20	13 (71) ^c
2009	20	7
2010	20–30	50

Notes: ^a Differences between the actual and allowable exploitation rate may reflect the fact that complexities involved in predicting the number of returning fish can make it difficult to achieve the allowable rate with precision. For further explanation, see Chapter 5, Sockeye fishery management.

^b According to Exhibit 1218, actual exploitation rates are preliminary.

^c The second exploitation rate in 2008 (71) is data from the Pacific Salmon Commission. The discrepancy reflects differences in how DFO and the PSC account for fish taken for hatchery operations. In other years, the exploitation rates are the same.

Sources: Compiled using data from Exhibit 1218, p. 6; Exhibit 445, p. 28; Exhibit 804A, p. 5; and Transcript, January 21, 2011, pp. 60–61.

In 2010, in light of the unprecedented high return of sockeye salmon, the Cultus Lake sockeye exploitation rate was increased from the 20–30 percent maximum set out in the IFMP.¹⁴⁴ The vast majority of these Cultus Lake sockeye were from the hatchery program.¹⁴⁵ Dr. Bradford and colleagues caution that, if smolt-recruit survival increases for Late-run stocks (as it did for the 2010 harvest) including Cultus Lake, and harvest rates are concordantly increased, recovery to the

estimated lower WSP benchmark is unlikely.¹⁴⁶ The exploitation rate for Cultus Lake in 2010 was approximately 50 percent, the highest since 1997.¹⁴⁷ However, escapement was also the highest since 1999–2000, approximately 10,000 fish.¹⁴⁸ Rob Morley, vice-president of the Canadian Fishing Company and an economist with a fishing industry background and experience with DFO, explained:

[W]e expected to see, based on the size of the runs coming back and the forecast for Cultus, a run of ten to fifteen thousand, that if we had held to the preseason exploitation rate ... we would have given up somewhere in the range of two to three million sockeye in the catch for all user groups for the Late runs.¹⁴⁹

Testifying along with Mr. Morley, Michael Staley, a fisheries advisor to various Aboriginal groups, added that discussions took place with “some of the First Nations who have direct interest in Cultus” before DFO staff took their recommended exploitation rate to the minister.¹⁵⁰ When questioned about the 2010 exploitation rate, Ms. Farlinger and Jeff Grout, salmon resource manager, Salmon Team, DFO, both testified that the harvest rate went above 30 percent only at the time that DFO was confident that the escapement for Cultus Lake would meet the first two rebuilding goals of the recovery strategy.¹⁵¹

When asked whether there is a “real disconnect” between his work and the work of “any other level of DFO” as it relates to Cultus Lake sockeye, Mr. Schubert agreed that there is. Formalizing the conservation activities through a WSP response team was one way he suggested to address the disconnect.¹⁵²

Enhancement program

DFO staff have been carrying out enhancement work at Cultus Lake since 2000 (see Chapter 6, Habitat management, for a general description of salmon enhancement). This work consists of a captive-breeding program as well as fry and smolt supplementation. The primary purpose of enhancement work at Cultus Lake is, through the captive breeding program, to preserve the genetic diversity of the Cultus population in the event of catastrophic losses in the wild

population. Fry and smolt supplementation is an important but secondary objective.¹⁵³ DFO decided to begin phasing out the captive breeding program around 2010; the supplementation program will be re-evaluated in 2013.¹⁵⁴

The captive breeding program involved rearing to maturity a parallel population of fish in captivity. For every brood year since 2000, DFO attempted to collect a genetically diverse sample of the Cultus Lake sockeye population for breeding.¹⁵⁵ Dr. Bradford described the captive breeding program as “very scientifically rigorous.”¹⁵⁶ He testified that captive breeding “has been successful in the insurance policy aspect of it. It was designed to provide a living gene bank of fish in case there was a catastrophic loss of spawners in the lake due to disease issues. And so that was successful. They were able to keep adults reared in captivity.”¹⁵⁷

As the captive breeding process created more eggs than were needed to keep the program going, excess eggs were used for supplementation. The eggs were incubated and fish were reared to the fry or smolt stage, then released to Cultus Lake or Sweltzer Creek. Hatchery fish were typically marked by adipose fin clips to distinguish them from wild fish on their return as adults. Dr. Bradford testified that hatchery fry have been a major contributor to the number of adults returning to Cultus Lake.¹⁵⁸ In 2008 and 2009, two weak cycles, hatchery fish made up more than 85 percent of the returns.¹⁵⁹ He further stated that the hatchery fry that survived to be smolts had roughly the same marine survival as wild smolts. However, DFO has not yet established the reproductive success of hatchery fry that return as adults. This determination, Dr. Bradford said, is complex and cannot yet be completed.¹⁶⁰

The Bradford paper recommends that the captive breeding program be phased out because the severe pre-spawn mortality of 1999–2000 has not reoccurred and because of the risks “from both a genetic and fish culture perspective.”¹⁶¹ Mr. Schubert recalled that the conservation team, at a meeting around December 2010, decided to terminate captive breeding but to continue supplementations until the 2013 brood year.¹⁶² At that point, the last captive-bred fry would be released, and the team would conduct a full review of enhancement to determine whether it is still required

to achieve the goal of a self-sustaining, genetically robust population in the wild – a situation that implies no enhancement activities.¹⁶³ Dr. Bradford and colleagues acknowledge the potential for an ongoing hatchery program, meaning that some wild fish would be taken as they came to the lake and that they would spawn in a hatchery, depending on the relative reproductive success of hatchery fish in the wild.¹⁶⁴ In his testimony, Dr. Bradford described this program as “a fairly low level of enhancement but it could provide, again, an insurance policy if there was a catastrophic event.”¹⁶⁵

Measures to improve freshwater survival

Pikeminnow removal

The northern pikeminnow is a large cyprinid common in British Columbia and native to Cultus Lake. Although there are many predators of juvenile sockeye in Cultus Lake, including other salmonids and sculpins, the sheer number of pikeminnows made them the greatest threat to the population, according to DFO, at least in 2005 before regular pikeminnow removals began (see the discussion of predator removal in Volume 2, Chapter 4, Decline-related evidence).¹⁶⁶

The original predator removal program in Cultus Lake was conducted in the 1930s. Dr. Bradford explained that the program at that time “gillnetted every fish out of the lake,” including trout, pikeminnows, suckers, and other fish.¹⁶⁷ Modern predator removal efforts in Cultus Lake are more refined, targeting pikeminnows exclusively.

In 2004 and 2005, DFO undertook preliminary studies to determine how many pikeminnow were in Cultus Lake. They also removed about 6,000 pikeminnow. From 2006 to 2009, members of the commercial fishing industry, after discussions with DFO staff, removed about 42,000 adult and 17,000 juvenile pikeminnow.¹⁶⁸ Dr. Bradford testified that the commercial fishing industry’s pikeminnow removal efforts were funded by the Pacific Salmon Commission (PSC) Southern Endowment Fund for three to four years. Although that funding has since been lost, the commercial fishing sector has continued with the program. I heard from many

witnesses how the Commercial Salmon Advisory Board uses funds from the sale of sockeye salmon to reinvest in Cultus Lake sockeye conservation efforts.¹⁶⁹ Dr. Bradford testified that DFO recognized the expertise and equipment of the commercial fishing sector and helped it to obtain PSC funding, when available, and to collect and analyze data. He considered it “a good partnership in which the strengths of each group are brought to bear.”¹⁷⁰

The Bradford paper observes “a consistent positive trend in the survival of juvenile sockeye coincident with the removal of predators.”¹⁷¹

Dr. Bradford testified that, based on recent data as well as the work done in the 1930s and early 1990s, pikeminnow removal appears to have increased the survival of juvenile salmon in the lake, especially for very small broods of salmon.¹⁷² Although there is no proof of causation, he testified that an inference of causation is warranted because the data from the three different time spans are consistent: “[I]f it was a coincidence,” he said, “I don’t think we’d see it over and over in time.”¹⁷³

When asked about the lack of a predator removal program from 1992 until the mid-2000s, despite DFO becoming aware that the Cultus Lake population was in trouble around 2000, Dr. Bradford could not provide an explanation.¹⁷⁴ However, he did explain that the northern pikeminnow is a native species to British Columbia that has inhabited Cultus Lake as long as sockeye salmon have; it is not an invasive or introduced species.¹⁷⁵ Although pikeminnow removal has been successful in Cultus Lake, the witnesses I heard from did not see pikeminnow removal as something that should necessarily be pursued in other sockeye lakes. Dr. Bradford cautioned that predator removal carries inherent risks and warned that, when we manipulate predator-prey relationships, things can go awry.¹⁷⁶ In his 2010 status paper he also warned that “[t]here is uncertainty whether the predator control program can be maintained at decadal scales, or if a ‘surprise’ outcome may result from this long term manipulation of the ecosystem.”¹⁷⁷ He emphasized that Cultus Lake sockeye are a unique circumstance.¹⁷⁸ Jeremy Hume, one of the co-authors of the Bradford paper and qualified as an expert at the hearings on freshwater predation on sockeye salmon, explained that predators have a stronger effect on survival at low densities, so predator control is more effective for low-density populations than for high-density populations.¹⁷⁹

As well, sockeye are found in large amounts in the stomachs of other fish species, such as trout.¹⁸⁰ He stated that, for weak populations, predator removal may be a way to help rebuild the population by increasing their survival, but he warned that Cultus is a small lake and that it is not known whether the technique could be transferred to larger systems (see the discussion of ecosystem-based management in Chapter 4, DFO overview).¹⁸¹

Watermilfoil removal

Eurasian watermilfoil (milfoil) is an invasive plant introduced to North America more than a century ago and first observed in Cultus Lake in the late 1970s. It colonizes the lake bottom to the depth of light penetration and has spread across most of Cultus Lake’s nearshore area. Recent surveys show that it continues to spread, though more slowly.¹⁸²

The effect milfoil has had on Cultus Lake sockeye is uncertain. It is thought to impair spawning habitat and, potentially, to provide habitat for young fish such as pikeminnow that ultimately prey on sockeye. Dive surveys in 1982 found that dense patches of milfoil had displaced sockeye from areas previously used for spawning. After removal in 1983, large numbers of spawners returned to cleared areas. However, Cultus Lake sockeye have been observed spawning in deeper areas that milfoil cannot colonize.¹⁸³ Dr. Bradford testified that remote-operated vehicle photography work completed after the conservation strategy was written showed that sockeye spawn much deeper than previously thought. This finding has alleviated some of the concern about milfoil. Still, it is not clear whether spawning salmon prefer the deep-water areas or whether they are sub-optimal for spawning and the salmon use them simply because they are free of milfoil. As Dr. Bradford stated, milfoil has “probably affected where fish spawn, but it hasn’t prevented fish from spawning, we don’t think so.”¹⁸⁴

Dr. Bradford testified that milfoil is an extremely difficult weed to control. DFO conducted an experimental removal under the recovery strategy, but the milfoil grew back within months.¹⁸⁵ DFO has since abandoned attempts to remove milfoil. Mr. Schubert agreed that when spawner populations increase “to probably the top of the [WSP] red zone limit,” milfoil may become a limiting factor, and DFO may need to consider removal options again.¹⁸⁶

Habitat assessment and restoration

Cultus Lake has been a popular location for summer recreation for over a century and, at present, millions of visitors visit every year. When sockeye salmon share spawning and rearing habitat with so many people, conflicts are likely to occur.

The authors of the conservation strategy did not identify freshwater habitat loss as the main cause of the decline of the Cultus Lake sockeye population. Nonetheless, they recognized that the alleviation of freshwater habitat issues should improve survival at all life stages and contribute to recovery of Cultus Lake sockeye. The conservation strategy documents a number of examples of human activity in or near Cultus Lake and, for some of them, the impact they have likely had on the habitat:

- Disturbance by swimmers at the lake outlet can delay fish for several hours.
- Boating causes pollution of the water with hydrocarbons and metals.
- Recent developments in the vicinity include gravel mines, golf courses, water slides, boat and jet-ski rentals, and riding stables.
- Habitat alterations include the logging of lowland and higher elevations; the removal of shoreline vegetation for beaches, campsites, and boat launches; creek channelization; the addition of sand to beaches; and the construction of wharves and piers.
- Septic systems for surrounding residences and campgrounds have the potential for seepage into the lake.
- Several stormwater runoff systems discharge directly into the lake.¹⁸⁷

The conservation strategy notes that the relationship of Cultus Lake sockeye to its freshwater environment needs more study:

When it comes to understanding the threats to the population, the weakest links may be our knowledge of habitat capacity and the impacts of habitat change. The overall importance of such impacts is difficult to assess because there are significant knowledge gaps about how habitat is used by various life stages of Cultus sockeye. Measures for protecting habitat will be much better designed and justified if they are based on solid data.¹⁸⁸

Since 2005, when the conservation strategy was nearly finalized, DFO has made some effort to map and assess habitat features and threats at Cultus Lake. These efforts include studies of nutrient sources, led by the Cultus Lake Stewardship Society, and, through DFO Science, limnological and hydroacoustic assessments of the lake.¹⁸⁹ DFO oversaw a study on groundwater percolation and another on contaminants, and, as I describe above, it attempted to study and address milfoil.¹⁹⁰

When asked to identify any activities in the last six years that would constitute attempts to mitigate the effects of various threats on Cultus Lake sockeye habitat, Mr. Schubert spoke of efforts to improve knowledge of the role habitat has played in the collapse of the population rather than of particular efforts to mitigate any potential impact.¹⁹¹ He and Dr. Bradford could not identify measures taken to mitigate the impact of any threat on the habitat. Mr. Schubert explained, "The collection of knowledge was our first step. And beyond that, I don't think we've identified any smoking gun, therefore there haven't been much in the way of attempts to change habitats."¹⁹² Overall, the tenor of the witnesses' evidence was that, because the limited habitat assessment work undertaken to date has not identified impact on habitat as a cause of decline, mitigating habitat threats has not been a priority.

However, not all the habitat threats identified in the recovery strategy have been assessed. Cultus Lake's Lindell Beach provides an example. Although the distribution and behaviour of adult Cultus sockeye within the lake are poorly known, a general trend has emerged – sockeye are no longer found spawning in shallow beach habitat to the same extent that they were in the past.¹⁹³ The conservation strategy notes that Lindell Beach was once a heavily used sockeye spawning area.¹⁹⁴ When Mr. Schubert was questioned about the habitat disturbances at Lindell Beach, he explained that the beach was initially developed as a summer cottage area in the 1950s and that a significant number of cottages have been built right on the beach, many with piers. He testified that he was not aware of any direct impact on the habitat from the cottages and piers, but that, to his knowledge, DFO had not assessed the impact in any structured way.¹⁹⁵

The conservation strategy notes that it was not possible to determine the type of spawning habitat which Cultus sockeye prefer, whether deeper or shallower habitats:

On the one hand, if the shallower habitats where spawners were historically observed are the preferred habitat, then recent impacts such as the encroachment of watermilfoil, changes to the aquifers and physical alteration of the beaches may have caused spawners to move to deeper water. If this is the case, the shallower areas require urgent attention. On the other hand, if the deeper habitats are preferred and the shallower habitats are only used when abundance is high (as it was in the late 1960s), then the total spawning area may be underestimated. Either way, while there may be enough habitat available for the current low spawning populations, it may be both quantitatively and qualitatively inadequate for the larger, recovered [populations] envisaged by the Team.¹⁹⁶

Dr. Bradford's testimony suggests that DFO has not gained further insight into the problem since it created the conservation strategy:

[W]e have early observations from biologists who dangled off the docks and watched the salmon, so I'm not sure that the docks caused the fish to not be at Lindell Beach. The one possibility is that they are at Lindell Beach because when the spawning populations were large they pushed into the shallow waters, and now that the spawning populations are small, they are now using the deeper areas that they always did use, but we didn't know about it until we got the underwater camera involved. So we're not sure why that change has occurred at Lindell Beach.¹⁹⁷

Without knowing why Cultus sockeye are not spawning at Lindell Beach, or any other area where they formerly spawned, DFO does not know whether attempting to protect or restore such habitat would be beneficial enough to justify the expense. It also has no assurance that other measures, such as harvest restrictions, will not be wasted because the larger escapements are limited by the reduced capacity of the spawning grounds.

Funding for Cultus Lake sockeye recovery efforts

Funding for Cultus Lake sockeye recovery efforts is allocated to three specific activities: smolt and adult enumeration; enhancement; and activities aimed at improving freshwater survival. Mr. Schubert testified that Cultus Lake recovery activities began receiving funding from the national Species at Risk Coordination / Espèces en Péri (SARCEP) program in the 2003/4 fiscal year. Those funds were to support the operations of the recovery team and to support commissioning research and reports as needed.¹⁹⁸ In late 2004, Dr. Davis informed the recovery team that the minister had committed to continue funding recovery actions despite the fact that Cultus Lake sockeye had not been listed under SARA.¹⁹⁹

In 2009, DFO officials decided that the national SARCEP program would no longer fund recovery for those species that Canada had declined to list under SARA.²⁰⁰ Mr. Schubert testified that he, as chair of the conservation team, was consulted on the impact the budget cuts would have. From 2009 onwards, Cultus Lake recovery funding became dependent on the Pacific Region. Mr. Schubert stated that the actual impact of that change in funding was limited because of the replacement funding that was made available: "Cultus actually got off quite lucky in that process because most of our projects were funded. There was a loss of projects directed towards investigations into freshwater survival but our other main projects were funded."²⁰¹ Some projects were funded through other means, such as limnological studies through A-based funding (see Chapter 4, DFO overview), and the pikeminnow removal program through the Pacific Salmon Commission and, later, through the initiative of the commercial fishing sector.²⁰²

In 2008, when the conservation team was assembled, one of its objectives was to develop an implementation plan to put the conservation strategy into action.²⁰³ However, at the time of the hearings, no plan had been developed. Mr. Schubert explained that, as funding from SARCEP depleted, "it was again kind of an ad hoc process off the side of tables of the team members without any real commitment other than the base recovery project. So a lot of the ... objectives on the terms of reference we have not been able to achieve because we simply do not have the resources to do so."²⁰⁴

Mr. Schubert testified that the SARCEP funding was more secure than having to rely on individual sectors to prioritize Cultus Lake recovery efforts among their decisions on funding allocation. He believed there is now a greater possibility that Cultus Lake recovery could lose capacity, depending on how each sector views Cultus Lake recovery among its overall priorities.²⁰⁵ Until 2009–10, funding for Cultus Lake sockeye recovery efforts was relatively stable.²⁰⁶ In 2010–11, the conservation team lost its funding for freshwater habitat recovery efforts, leaving only the enhancement and the enumeration programs funded.²⁰⁷ Mr. Schubert testified that, although the decision to terminate the captive breeding aspect of the enhancement program should mean that supplementation funding is relatively safe, “it’s always a concern that one of those two pieces [enhancement and enumeration programs] might be lost.”²⁰⁸

■ Assessing recovery against the recovery objectives and other benchmarks

In 2010, DFO reported that the prospects for Cultus Lake sockeye remained highly uncertain and that they were tied to future trends in marine survival.²⁰⁹ It is useful to consider the assessments of DFO’s progress on recovering Cultus Lake sockeye. Here I consider two such assessments, one from Dr. Bradford and colleagues, and one through the Marine Stewardship Council (MSC).

Dr. Bradford’s 2010 status assessment

I have already referred to a 2010 CSAS research paper by Dr. Bradford and colleagues (the Bradford paper), which reviews the current status of the population and the efficacy of some of the recovery measures that have been implemented. Dr. Bradford and colleagues considered the progress made in meeting all four objectives of the conservation strategy.* For objectives 3 (to permit COSEWIC delisting) and 4 (to

support long-term sustainable use) there were no numerical targets in the recovery strategy. In their evaluation, the authors substituted their estimations of lower and upper benchmarks of the WSP.²¹⁰ In his testimony, Dr. Bradford explained that the objectives were developed before the WSP and that he considered the substitution to be reasonable.²¹¹

The Bradford paper concludes that, since 2002, the Cultus Lake sockeye population has failed to meet each objective set out in the conservation strategy. The average number of spawners remains at about 1,000 fish, but two of the four cycle lines have consistently remained below 500 spawners, falling short of Objective 1. The second objective of growth in three of four years has not been met. Finally, the population is well below the lower and upper abundance benchmarks estimated by the authors: the average number of wild adult spawners entering the lake in the four years before 2010 was 997 fish; the estimated lower benchmark is 10,200 spawners.²¹²

Dr. Bradford and colleagues assessed only the “major recovery actions” – harvest reductions, captive broodstock, and predator control. They did not consider efforts to remove milfoil or address habitat threats. The assessment concludes that predator control work appears to have increased the survival of juveniles in the lake. It also finds that supplemental releases of juveniles from the captive breeding program to the lake have resulted in increasing numbers of returning hatchery adults, but their success as spawners in the wild remains unknown.²¹³

Dr. Bradford and colleagues conclude that low smolt-recruit survival is the main factor limiting population growth. They also conclude that the recovery of the Cultus Lake sockeye population remains highly uncertain and that continued monitoring is needed to determine if the recovery actions are in fact reducing risks to the population.²¹⁴

Marine Stewardship Council certification surveillance report

In Chapter 10, Wild Salmon Policy, I describe how the Marine Stewardship Council (MSC) certification

* Because only spawner abundance was evaluated, and not habitat or ecosystem considerations, the analysis is but a subset of the factors that might be included in a full WSP status evaluation.

process resulted in the certification of the Fraser River sockeye salmon fishery as a sustainable fishery, with a number of conditions to be met by DFO, the management agency. As part of the certification process, and to help the assessors as they evaluated its performance on three MSC conditions, DFO prepared a table that referred to the Bradford paper.²¹⁵ Intertek Moody Marine produced an assessment report entitled *Surveillance Report: British Columbia Commercial Sockeye Salmon Fisheries*, dated October 2011 (Surveillance Report).²¹⁶

Condition 7 of the Surveillance Report requires DFO to provide “a clear commitment to implement the recovery plan for Cultus sockeye and evidence that fisheries management actions are consistent with the recovery goals for Cultus sockeye.”²¹⁷ The report documents an indicator score increase from 70 to 80 (out of 100), due to DFO’s progress toward the recovery objectives for Cultus Lake sockeye and the protection of Cultus sockeye within the IFMP. In particular, fishery management actions to protect Cultus sockeye are clearly defined in IFMPs. The Surveillance Report observes that the Cultus exploitation rate in 2010 will likely exceed the 20–30 percent target range proposed for 2010, but because of the high returns, the escapement exceeded the short-term Cultus escapement objective. The degree of spawning success will not be known until the smolts are enumerated as they leave Cultus Lake in the spring of 2012.²¹⁸

Condition 28 also relates to Cultus Lake sockeye. It stipulates that DFO must provide target reference points for the Cultus Lake sockeye stock, a clear indication of the commitment to implement the Conservation Plan, and an assessment of the probability of recovery and the timing for recovery. Although the original score for this condition was 70, the assessors deferred drawing conclusions until the next surveillance audit because of concerns about the impact of the 2010 fishery on the recovery of Cultus Lake sockeye and the need to finalize the 2010 exploitation rates before assessing the potential impact of the fishery.²¹⁹

Condition 25 states that DFO must provide a clear commitment to implement recovery action plans for Cultus and Sakinaw sockeye salmon.

DFO’s plan to meet the condition includes implementing the WSP, particularly strategies 4 and 5.²²⁰ The assessors gave this indicator a score of 80.

The WSP and Cultus Lake sockeye recovery efforts

A May 2008 memorandum for the regional director general asserts that “extensive measures have been put in place under the *Fisheries Act* and the Wild Salmon Policy to conserve and recover [Cultus Lake sockeye].”²²¹ These measures did not include the identification of benchmarks for the Cultus Lake sockeye Conservation Unit under Strategy 1.* Moreover, the evidence showed no efforts directed toward Cultus Lake populations under strategies 2, 3, or 4.

DFO has not produced a habitat status report for Cultus Lake sockeye using indicators developed under the WSP.²²² Mr. Schubert was unable to explain why DFO hadn’t prioritized Cultus Lake in developing habitat status reports, noting that it “would be a relatively simple one.”²²³ He testified that the conservation team has a limited capacity, no budget, and is currently without a habitat representative. A WSP-driven habitat status report is a “fairly detailed document that we didn’t have the resources to address.”²²⁴ Mr. Schubert also agreed that creation of a WSP-driven habitat status report would be a useful process in general, although he stressed that the conservation team’s findings to date suggest that habitat has not played a significant role in the collapse of the Cultus Lake sockeye population.²²⁵

Asked how the recovery implementation process could be improved, Mr. Schubert suggested that the best process is identified in Strategy 4 of the WSP. The WSP speaks of interim procedures to expand the approach now used to develop IFMPs for salmon. It uses the term “response team” to describe interim multi-stakeholder groups that would provide recommendations for protection and restoration of priority Conservation Units.²²⁶ Mr. Schubert testified that he attempted to form a WSP response team in August 2006, but it “never went anywhere at regional headquarters.”²²⁷ The structure conferred on the

* The paper by Grant and colleagues (Exhibit 1915) and the Bradford paper (Exhibit 804) provide estimates or ranges that I describe above. As of the close of hearings, these estimates had not been formally adopted by DFO.

planning process by formalizing it under the WSP, he stated, would go a long way toward achieving an implementation plan that the conservation team has been unable to achieve.²²⁸

■ Findings

Throughout the hearings I heard differing opinions on the importance of smaller sockeye populations, such as Cultus Lake sockeye, to the overall sustainability of the Fraser River sockeye fishery. Some argued that, as long as the large Conservation Units (CUs) remain productive, some small CUs can be lost without sacrificing a sustainable Fraser River sockeye fishery.²²⁹ Others maintained that sustainable fisheries require at least some degree of biodiversity.²³⁰ The Wild Salmon Policy (WSP) holds that protecting diversity is “the most prudent policy for the future continuance of wild salmon.”²³¹ And to people who have sustained themselves historically on the harvest of a particular CU, biodiversity and a sustainable fishery are one and the same.²³²

The harvest management decisions the Department of Fisheries and Oceans (DFO) grapples with are said to involve trade-offs between biodiversity and exploitation; between degrees of conservation of some CUs, such as Cultus Lake, and degrees of forgone yield of others.* David Bevan, associate deputy minister, alluded to some of the negative outcomes of such decisions in the past:

We have an obligation to maintain biodiversity and we have seen that there’s an obvious, and significant, and severe, in some cases, socio-economic impact of not looking after the resources that we’re responsible for ... we have considerable and unpleasant experience in situations where we didn’t look after the stocks first and socio-economic impacts were much, much more severe than had we taken care of the fish first.²³³

For Fraser River sockeye and other Pacific salmon, the potential impact of these decisions

is supposed to be examined under the integrated strategic plans described in Strategy 4 of the WSP. Strategy 4, like most of the WSP strategies, has yet to be implemented.

With this context in mind, I provide my findings regarding DFO’s management of Cultus Lake sockeye. I must acknowledge that Cultus Lake sockeye are one salmon CU for which DFO should be making decisions under a policy intended to guide decisions for all Pacific salmon CUs. Therefore, my findings do not lead directly to specific recommendations. Instead, they serve to underscore the importance of the Wild Salmon Policy and the recommendations I make relating to its implementation in Volume 3 of this Report.

SARA listing advice

In 2004, DFO advised the minister of environment not to recommend emergency listing of Cultus Lake sockeye under the *Species at Risk Act* (SARA). In doing so, the evidence shows that DFO made a commitment to both the minister of environment and the public that it would undertake management measures to address the imminent threat to Cultus Lake sockeye.

I find that DFO followed through on some of its commitments to remove the imminent threat to Cultus Lake sockeye, such as removing pikeminnow and maintaining the enhancement program, but that it has achieved limited progress on other commitments. Eurasian watermilfoil (milfoil) removal proved too difficult, habitat assessment has not been done comprehensively, and there is no evidence of habitat restoration. Harvest restrictions, while significant, were not as stringent as DFO initially suggested, increasing from an allowable rate of 10–12 percent in 2004 and 2005 to 30 percent in 2006, and never again returning to 10–12 percent. Actual harvest rates, as set out in Table 1.11.1, also exceeded the allowable rates in 2004 and 2010.

DFO also advised the minister of environment not to recommend ordinary listing of Cultus Lake sockeye under SARA. In doing so, DFO again

* Dr. Carl Walters (a professor at the University of British Columbia), Transcript, February 9, 2011, pp. 38–39. However, see the contrasting testimony of Dr. Brian Riddell, chief executive officer of the Pacific Salmon Foundation, who stated that debates about trade-offs are actually debates about the rate of use, and that maximizing salmon production and salmon diversity are consistent objectives. This issue is discussed in chapters 10, Wild Salmon Policy, and 5, Sockeye fishery management.

committed to certain recovery measures. It also relied on the socio-economic impact analysis that arrived at a figure of \$125 million in lost revenue. I heard extensive evidence on the criticisms that the recovery team and others made of the socio-economic analysis.

I find that the analysis by DFO of the socio-economic impact of listing Cultus Lake sockeye under SARA was both procedurally and substantively deficient. DFO failed to take into account some critical biological factors as well as the biological uncertainty underpinning the analysis. The analysis focused sharply on short-term financial costs, giving little consideration to long-term benefits, social implications, or alternative fishing strategies. In my view, the recovery team should have been given the opportunity to provide input to the socio-economic analysis of the impact of listing the species, a topic with which its members were thoroughly familiar. The criticisms of the socio-economic analysis I summarize earlier in this chapter are well founded and provide an ample list of the ways DFO could improve future socio-economic analyses, particularly in moving forward with Strategy 4 of the WSP.

Regardless of whether DFO is again called on to advise the minister of environment on recommending SARA listing for a Fraser River sockeye population, DFO managers will continue to be faced with decisions that call on them to weigh biodiversity against harvest in a context of considerable uncertainty. Those decisions will be based on predictions of environmental, social, and economic impact. The WSP anticipates this kind of balancing and suggests a planning structure and procedure to address these issues in Strategy 4 and in Appendix 2. If preventing the loss of a small sockeye population is in fact prohibitively expensive in terms of social and economic impact, that decision will have to be arrived at through the collaborative, transparent process envisioned in Strategy 4. I discuss Strategy 4 in Chapter 10, Wild Salmon Policy, and make recommendations relating to it in Volume 3 of this Report.

Recovery measures

Although Cultus Lake sockeye returned in strong numbers in 2010, it is too soon to say whether

the CU is on its way to recovery. However, I am prepared to make findings of fact with respect to the recovery measures DFO has engaged in to date. Before doing so, I must mention that it became clear to me in the hearings that dedicated DFO staff working “on the ground” to protect Cultus Lake sockeye have put in considerable effort to protect this genetically unique population. I have no doubts about the integrity of the members of the recovery team or the DFO staff I heard from who worked tirelessly, with limited resources, to implement the recovery measures for the Cultus Lake sockeye CU.

Harvest restrictions

As I mentioned, following the decision not to list Cultus Lake sockeye under SARA, DFO reduced Cultus Lake sockeye exploitation rates significantly, although only for two years to the degree DFO initially proposed (see Table 1.11.1). Cultus Lake sockeye conservation objectives are supposed to inform harvest rates, but witnesses told me that the conservation team does not advise fisheries management directly, and it was not until 2011 that IFMPs explicitly referred to conservation objectives.

I accept the evidence that there has been a disconnect between the recovery team's conservation work and some of DFO's decisions that affect Cultus Lake sockeye, including harvest management decisions. The evidence was insufficient to allow me to draw conclusions on whether DFO is adequately considering Cultus Lake sockeye conservation objectives when setting exploitation rates. Nor can I conclude whether the target and actual exploitation rates have been conservative enough or more conservative than necessary – only after a number of years may the answer to that question emerge. Looking forward, the integrated strategic planning process described in Strategy 4 of the WSP should, when implemented, ensure that conservation objectives are fully integrated into harvest management decisions.

Enhancement program

DFO's captive breeding program for Cultus Lake sockeye has recently been terminated, as I wrote above, and the fry and smolt supplementation work will be re-evaluated in 2013. Witnesses described

the captive breeding program as successful, and evidence shows that supplementation has been a major contributor to the number of adults returning to Cultus Lake. The success of the enhancement program for Cultus Lake sockeye will depend on the relative reproductive success of hatchery fish in the wild, which remains to be determined.

Based on the evidence, I find that the conservation-based enhancement program at Cultus Lake appears to have contributed to Cultus sockeye survival. I support the course of action DFO is taking in re-evaluating the supplementation program in 2013.

Habitat assessment and restoration

The Cultus Lake sockeye CU is one of the most-studied populations of salmon in British Columbia, yet the evidence shows that significant gaps in knowledge remain regarding how Cultus Lake sockeye use their habitat throughout their life cycle. What is not known is easy to ignore. For example, DFO has not determined whether the existing Cultus Lake habitat, without further improvements, will be capable of supporting the larger population envisioned by the conservation strategy and preliminary WSP benchmarks. As a result, DFO does not understand the extent to which milfoil encroachment and other habitat changes in Cultus Lake may have the potential to limit the benefit accrued from harvest restrictions or other recovery measures. There was no evidence of DFO completing habitat restoration work, other than failed attempts to remove milfoil. As Chapter 6, Habitat management, shows, the unrelenting, incremental loss and degradation of fish habitat remains a significant challenge for DFO to address.

The evidence leads me to conclude that, because DFO has not identified impact on habitat as a cause of the decline of Cultus Lake sockeye, the department does not consider it a priority to address the impact of various threats on habitat in and around Cultus Lake. Impact and threats to habitat have not yet been fully assessed, and as a result, it is unclear whether other conservation measures, such as harvest restrictions, will be fully effective in meeting the conservation objectives. Although the Bradford paper is an important assessment of Cultus Lake sockeye, nothing DFO has produced for Cultus Lake sockeye captures the detail envisioned

in a WSP habitat status report. In my view, completing a habitat status report under Strategy 2 of the WSP would likely benefit the Cultus Lake sockeye CU.²³⁴ Habitat status information is used to inform decisions under Strategy 4. I discuss habitat status reports in Chapter 10, Wild Salmon Policy, and make recommendations relating to Strategy 2 in Volume 3.

Pikeminnow removal and habitat monitoring

I describe above that DFO and the commercial fishing sector have removed pikeminnow from Cultus Lake in order to increase juvenile Cultus sockeye survival. I also explain that, although many fish in Cultus Lake prey on juvenile sockeye, only the native pikeminnow has been targeted for removal. The evidence is clear that pikeminnow removal is associated with increased Cultus sockeye survival. It may be less effective if the Cultus Lake population increases in size, and it may not be effective at all in other lake systems. Dr. Bradford and Mr. Hume cautioned that pikeminnow removal, as an artificial manipulation of the ecosystem, brings unknown risks.

In their 2010 status paper, Dr. Bradford and colleagues proposed five recommendations for Cultus Lake sockeye.²³⁵ Although I found them all appropriate, it is not necessary to repeat them here. In my view, the central theme underlying their recommendations is the need for a thorough monitoring program and continual review of the ongoing recovery measures. As the authors advise, the current recovery measures are essential if we are to recover the Cultus Lake sockeye population, but the exact nature of the measures and their effects must be continually reviewed and monitored. Monitoring at Cultus Lake will also help DFO better understand the degree of success that similar recovery measures may have for other sockeye populations, although not all measures that are effective for Cultus Lake will be appropriate for other populations, and vice versa.

I accept the evidence that, in Cultus Lake, pikeminnow removal has increased freshwater fry survival at low densities. I also find that pikeminnow removal is in many respects a good example of DFO and industry collaboration toward common objectives. However, manipulation of a species and

its environment is both risky and experimental. Pikeminnow removal may also be contrary to ecosystem-based management (see Chapter 4, DFO overview). If pikeminnow removal continues in Cultus Lake, DFO must oversee rigorous monitoring of the Cultus Lake ecosystem to ensure that this artificial manipulation of the environment does not trigger undesirable side effects. Monitoring to understand changes in freshwater ecosystems is the crux of WSP Strategy 3. I address monitoring under the WSP in Chapter 10, Wild Salmon Policy, and I make recommendations in Volume 3 of this Report.

Effective recovery planning

I explain above that DFO has not satisfied any of the four objectives it set out in the Cultus Sockeye Conservation Strategy. In my view, at least five related factors may have inhibited the effectiveness of DFO's recovery planning for Cultus Lake sockeye.

- First, the recovery team was disbanded shortly after finalizing the recovery strategy in 2005, leaving a void in recovery planning.
- Second, the conservation team that formed in 2007 with DFO-only membership has been unable to achieve its mandate. The evidence shows that, following the loss of dedicated SARCEP funding, the conservation team has been under-resourced.
- Third, after finalizing the recovery strategy, DFO failed to prepare an action or implementation plan. The lack of an action plan for Cultus Lake sockeye has meant that DFO has been without the component that “actually accomplishes the work.”²³⁶ Had the population been listed under SARA, DFO would have been obliged to publish an action plan within the time specified in the recovery strategy.²³⁷

- Fourth, as I mention above, it is not clear whether there is an adequate process for Cultus Lake sockeye conservation objectives to inform fisheries management decisions effectively.
- The fifth and perhaps overriding factor is that the WSP has not guided recovery planning for Cultus Lake sockeye. The evidence shows that, despite significant work to estimate benchmarks for Cultus Lake sockeye, DFO has not officially identified even provisional benchmarks under Strategy 1. Moreover, DFO has not directed any efforts toward Cultus Lake sockeye under the other WSP strategies.

It is not necessary, nor does the evidence permit me, to attempt to determine the extent to which each factor or factors were responsible for the lack of progress in recovery planning and implementation. It may have been a number of them in combination, or there may have been other factors at play that did not emerge from the evidence before me. However, in my view, Cultus Lake sockeye recovery would likely have benefited from an action or implementation plan to achieve the conservation strategy's objectives. Under the WSP, strategic planning for Cultus Lake sockeye, or any other salmon CU, is supposed to occur under Strategy 4. The WSP speaks of interim procedures under Action Step 4.1 to plan for salmon recovery, including the formation of “response teams.” Witnesses told me that the recovery team, because it included representatives of First Nations and other local and regional interests, resembled a WSP-driven response team. I accept Mr. Schubert's testimony that a formal WSP-driven process would probably go a long way toward achieving the implementation plan for Cultus Lake sockeye that DFO has so far been unable to achieve.

Notes

- 1 Exhibit 914, p. 7; Rob Morley, Transcript, October 28, 2010, pp. 47–48; Brian Riddell, Transcript, February 2, 2011, p. 14; Neil Schubert and Michael Bradford, Transcript, June 1, 2011, p. 61.
- 2 Exhibit 914, p. 6.
- 3 Exhibit 772, p. 1.
- 4 Carl Walters, Transcript, February 9, 2011, p. 62; Exhibit 914, p. 13.
- 5 Exhibit 930, p. 1; Exhibit 924, p. 60; Exhibit 914, p. 13.

- 6 Exhibit 1915, pp. 48–51, 117–18.
- 7 Exhibit 562, p. 92 (Table 1).
- 8 Exhibit 924, p. ii.
- 9 Michael Lapointe, Transcript, January 19, 2011, pp. 32–35.
- 10 Exhibit 913, pp. 34–35; Barry Rosenberger, Transcript, January 24, 2011, p. 81; Karl English, Transcript, April 15, 2011, p. 58.
- 11 Exhibit 924, p. 31.
- 12 Exhibit 913, pp. 34–38; Exhibit 931; Exhibit 924, pp. 31–32;

- Rob Morley, Transcript, June 3, 2011, pp. 75–77; Jim Woodey, Transcript, February 9, 2011, pp. 40–41.
- 13 See, e.g., Public submission 0276-COSTIN, available at www.cohencommission.ca.
- 14 Exhibit 913, p. vii; Carl Walters, Transcript, February 10, 2011, p. 56.
- 15 Timber Whitehouse, Transcript, February 3, 2011, pp. 12–13.
- 16 Exhibit 8, p. 35; Susan Farlinger, Transcript, December 16, 2010, pp. 51–52.
- 17 Exhibit 8, pp. 9, 27, 45.
- 18 Transcript, May 31, 2011, p. 86.
- 19 John Davis, Transcript, May 30, 2011, p. 6; Exhibit 916, p. 1.
- 20 Exhibit 924.
- 21 Exhibit 913, p. ix.
- 22 Neil Schubert, Transcript, May 31, 2011, pp. 42–43.
- 23 Exhibit 913, p. 40.
- 24 Exhibit 913, pp. i, ix.
- 25 Exhibit 913, p. 39.
- 26 John Davis, Transcript, May 30, 2011, p. 7, and July 8, 2011, p. 15; Neil Schubert, Transcript, May 31, 2011, p. 43. See also Exhibit 887, p. 2.
- 27 Exhibit 885, p. 1.
- 28 Exhibit 916, pp. 1–2.
- 29 Transcript, May 31, 2011, p. 70.
- 30 Transcript, June 1, 2011, p. 3; Exhibit 914, p. 46.
- 31 Neil Schubert, Transcript, May 31, 2011, p. 71.
- 32 Transcript, May 31, 2011, p. 72. See also pp. 89–90.
- 33 Transcript, June 1, 2011, pp. 61–63.
- 34 Exhibit 925.
- 35 Transcript, December 2, 2010, p. 7.
- 36 Exhibit 897, p. 2.
- 37 *Georgia Strait Alliance v. Canada (Minister of Fisheries and Oceans)*, 2012 FCA 40, paras 109, 126–31.
- 38 *Species at Risk Act*, SC 2002, c. 29, s. 27(1), s. 27(2)(b), s. 2(1).
- 39 *Species at Risk Act*, SC 2002, c. 29, s. 27(1.1).
- 40 *Species at Risk Act*, SC 2002, c. 29, s. 29(1).
- 41 Exhibit 1329, p. 2.
- 42 Exhibit 887, p. 1.
- 43 Exhibit 887.
- 44 Exhibit 1329; John Davis, Transcript, July 8, 2011, pp. 1–2.
- 45 John Davis, Transcript, May 30, 2011, pp. 7–8; Exhibit 1329, p. 4.
- 46 Exhibit 887, p. 3.
- 47 Exhibit 1330, p. 1.
- 48 Exhibit 1329, p. 4.
- 49 Exhibit 1329, p. 13.
- 50 Exhibit 886.
- 51 *Species at Risk Act*, SC 2002, c. 29, s. 27(1.1).
- 52 John Davis, Transcript, May 30, 2011, pp. 11–12.
- 53 John Davis, Transcript, May 31, 2011, p. 89.
- 54 Exhibit 909, p. 1.
- 55 Transcript, June 1, 2011, p. 58.
- 56 Transcript, June 1, 2011, pp. 58–59.
- 57 Exhibit 909, pp. 1–2.
- 58 John Davis, Transcript, May 30, 2011, p. 12.
- 59 Exhibit 895, p. 114.
- 60 Exhibit 892A.
- 61 Exhibit 1331, p. 4.
- 62 Transcript, May 31, 2011, p. 74.
- 63 Exhibit 892h, p. 3.
- 64 Transcript, June 1, 2011, p. 51; Exhibit 917.
- 65 Transcript, June 1, 2011, p. 51.
- 66 Neil Schubert, Transcript, May 31, 2011, p. 75.
- 67 Neil Schubert, Transcript, May 31, 2011, pp. 74–75.
- 68 Transcript, June 1, 2011, p. 52. See also Exhibit 917.
- 69 Neil Schubert, Transcript, June 1, 2011, p. 53; Exhibit 917.
- 70 Transcript, June 1, 2011, pp. 52–53.
- 71 Exhibit 932, p. 1.
- 72 Exhibit 891, p. 17.
- 73 Exhibit 893, pp. 1–2.
- 74 Exhibit 892G, p. 4.
- 75 Exhibit 893, p. 2.
- 76 Exhibit 891, p. 17.
- 77 Transcript, June 1, 2011, pp. 41–42; Exhibit 892G. See also Exhibit 896.
- 78 Exhibit 892G, pp. 3–4.
- 79 Transcript, May 31, 2011, pp. 29–30.
- 80 Neil Schubert, Transcript, May 31, 2011, pp. 72–73; Neil Schubert, Transcript, June 1, 2011, pp. 3–4.
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- 82 Exhibit 890; John Davis, Transcript, May 30, 2011, p. 16.
- 83 Transcript, June 1, 2011, p. 4.
- 84 Transcript, June 1, 2011, pp. 51–52.
- 85 Exhibit 918, p. 9.
- 86 Exhibit 892G, pp. 1–2; Exhibit 896, p. 12.
- 87 Exhibit 894, p. 1.
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- 89 Exhibit 918, p. 10.
- 90 Transcript, September 28, 2011, pp. 43–44.
- 91 Transcript, September 28, 2011, pp. 44–45.
- 92 John Davis, Transcript, May 30, 2011, pp. 16–17.
- 93 John Davis, Transcript, May 30, 2011, pp. 14–15.
- 94 Exhibit 889, p. 3.
- 95 Exhibit 889A, p. 4.
- 96 Exhibit 889B, p. 8.
- 97 Exhibit 1331, p. 5.
- 98 Exhibit 1331, p. 6.
- 99 Exhibit 1333, p. 1.
- 100 Exhibit 895.
- 101 Exhibit 895, p. 103.
- 102 Exhibit 895, p. 96.
- 103 Exhibit 895, p. 113.
- 104 Exhibit 895, p. 114.
- 105 Exhibit 895, p. 104.
- 106 Exhibit 920, p. 3.
- 107 Exhibit 916, at p. 2.
- 108 Transcript, Neil Schubert, May 31, 2011, pp. 44, 89.
- 109 Transcript, Neil Schubert, May 31, 2011, pp. 44–45.
- 110 Transcript, Neil Schubert, May 31, 2011, pp. 45–46. The final Conservation Strategy is Exhibit 914.
- 111 Exhibit 922, p. 2.
- 112 Exhibit 919.
- 113 Transcript, May 31, 2011, p. 77.
- 114 Exhibit 928, p. 1; Neil Schubert, Transcript, May 31, 2011, p. 95.
- 115 Exhibit 928, p. 1.
- 116 Transcript, May 31, 2011, p. 78; Exhibit 916.
- 117 Exhibit 426; Jeffery Young, Transcript, February 11, 2011, p. 63.
- 118 Exhibit 426, p. 1.
- 119 Exhibit 921.
- 120 Exhibit 921, p. 2.
- 121 Exhibit 921, p. 2.
- 122 Transcript, May 31, 2011, pp. 41–42.
- 123 Exhibit 922.
- 124 Exhibit 922.
- 125 Transcript, May 31, 2011, pp. 42, 81.
- 126 Transcript, May 31, 2011, p. 46.
- 127 Exhibit 926.
- 128 Exhibit 914, p. 4.
- 129 Transcript, May 31, 2011, p. 47.
- 130 Exhibit 914, p. 4.
- 131 *Species at Risk Act*, SC 2002, c. 29, s. 49.
- 132 Exhibit 920; Exhibit 1218; Exhibit 1218A.
- 133 Exhibit 928; Neil Schubert, Transcript, May 31, 2011, p. 95.
- 134 Transcript, June 2, 2011, pp. 95–97. See also Jeff Grout, Transcript, January 17, 2011, pp. 33, 51.

- 135 Transcript, January 21, 2011, pp. 23–24.
- 136 Transcript, May 31, 2011, p. 63.
- 137 Exhibit 1915, p. 50.
- 138 Exhibit 1218, pp. 3–4.
- 139 Exhibit 804.
- 140 Transcript, May 31, 2011, pp. 63–64.
- 141 Exhibit 804, p. 16.
- 142 Exhibit 1218, p. 6; Exhibit 886, p. 1.
- 143 Exhibit 1218, p. 6.
- 144 Barry Rosenberger, Transcript, January 21, 2011, pp. 5–6.
- 145 Barry Rosenberger, Transcript, January 24, 2011, pp. 20–21.
- 146 Exhibit 804, p. 20.
- 147 Exhibit 804A, p. 5.
- 148 Exhibit 804A, p. 2.
- 149 Transcript, February 8, 2011, p. 50.
- 150 Transcript, February 8, 2011, pp. 118–19.
- 151 Transcript, November 2, 2010, p. 43; Jeff Grout, Transcript, January 21, 2011, p. 60.
- 152 Transcript, June 1, 2011, p. 66.
- 153 Exhibit 804, p. 6.
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- 155 Exhibit 804, p. 6.
- 156 Transcript, May 31, 2011, p. 50.
- 157 Transcript, May 31, 2011, pp. 65–66.
- 158 Transcript, June 1, 2011, p. 29; Exhibit 804, p. 19.
- 159 Exhibit 804, p. 12.
- 160 Transcript, June 1, 2011, p. 29; Exhibit 804, p. 19.
- 161 Exhibit 804, p. 22.
- 162 Transcript, May 31, 2011, p. 66.
- 163 Transcript, May 31, 2011, pp. 66–67; Transcript, June 1, 2011, p. 64.
- 164 Exhibit 804, p. 22.
- 165 Transcript, May 31, 2011, p. 66.
- 166 Exhibit 914, p. 12.
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- 168 Exhibit 804, p. 16.
- 169 Paul Sprout, Transcript, November 4, 2010, pp. 123–24; Ernie Crey, Transcript, July 4, 2011, p. 40; Ken Malloway, Transcript, May 12, 2011, pp. 67–68.
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- 171 Exhibit 804, p. 18.
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- 173 Transcript, May 31, 2011, p. 65.
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- 175 Transcript, May 31, 2011, p. 51.
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- 177 Exhibit 804, p. 20.
- 178 Transcript, June 1, 2011, pp. 40–41.
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- 180 Transcript, May 5, 2011, p. 47.
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- 182 Exhibit 914, p. 13; Michael Bradford, Transcript, May 31, 2011, p. 52.
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- 199 Exhibit 918, p. 5; Neil Schubert, Transcript, May 31, 2011, p. 76.
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- 201 Transcript, May 31, 2011, p. 83.
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- 203 Exhibit 922, p. 2.
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- 205 Transcript, June 1, 2011, pp. 25–26.
- 206 Exhibit 927.
- 207 Exhibit 927.
- 208 Transcript, June 1, 2011, pp. 25–26.
- 209 Exhibit 1915, p. 49.
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- 213 Exhibit 804, p. v.
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- 216 Exhibit 1993A.
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- 218 Exhibit 1993A, pp. 27–29.
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- 220 Exhibit 1993A, pp. 42–43.
- 221 Exhibit 922, p. 1.
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- 223 Transcript, June 1, 2011, p. 19.
- 224 Transcript, May 31, 2011, p. 56.
- 225 Transcript, June 1, 2011, p. 20.
- 226 Exhibit 8, p. 26.
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- 231 Exhibit 8, p. 9.
- 232 Michael Staley, Transcript, February 7, 2011, p. 75.
- 233 Transcript, November 2, 2010, p. 70.
- 234 Transcript, June 1, 2011, p. 20.
- 235 Exhibit 804, p. 22.
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- 237 *Species at Risk Act*, SC 2002, c. 29, s. 27 (1), s. 41(1)(g).

APPENDICES

Appendix A • Terms of Reference



CANADA

PRIVY COUNCIL • CONSEIL PRIVÉ

P. C. 2009-1860
November 5, 2009

Whereas the decline in sockeye salmon stocks in the Fraser River in British Columbia has necessitated the closure of the fishery for a third consecutive year, despite favourable pre-season estimates of the number of sockeye salmon expected to return to the Fraser River;

Whereas that decline has been attributed to the interplay of a wide range of factors, including environmental changes along the Fraser River, marine environmental conditions and fisheries management;

Whereas the Government of Canada wishes to take all feasible steps to identify the reasons for the decline and the long term prospects for Fraser River sockeye salmon stocks and to determine whether changes need to be made to fisheries management policies, practices and procedures — including establishing a commission of inquiry to investigate the matter;

And whereas the Government of Canada has committed to full cooperation with an inquiry;

Therefore, Her Excellency the Governor General in Council, on the recommendation of the Prime Minister, hereby

(a) directs that a Commission do issue under Part I of the *Inquiries Act* and under the Great Seal of Canada appointing the Honourable Bruce Cohen as Commissioner to conduct an inquiry into the decline of sockeye salmon in the Fraser River (the "Inquiry"), which Commission shall

.../2

P. C. 2009-1860

- 2 -

(i) direct the Commissioner

(A) to conduct the Inquiry without seeking to find fault on the part of any individual, community or organization, and with the overall aim of respecting conservation of the sockeye salmon stock and encouraging broad cooperation among stakeholders,

(B) to consider the policies and practices of the Department of Fisheries and Oceans (the "Department") with respect to the sockeye salmon fishery in the Fraser River — including the Department's scientific advice, its fisheries policies and programs, its risk management strategies, its allocation of Departmental resources and its fisheries management practices and procedures, including monitoring, counting of stocks, forecasting and enforcement,

(C) to investigate and make independent findings of fact regarding

(I) the causes for the decline of Fraser River sockeye salmon including, but not limited to, the impact of environmental changes along the Fraser River, marine environmental conditions, aquaculture, predators, diseases, water temperature and other factors that may have affected the ability of sockeye salmon to reach traditional spawning grounds or reach the ocean, and

(II) the current state of Fraser River sockeye salmon stocks and the long term projections for those stocks, and

(D) to develop recommendations for improving the future sustainability of the sockeye salmon fishery in the Fraser River including, as required, any changes to the policies, practices and procedures of the Department in relation to the management of the Fraser River sockeye salmon fishery,

.../3

P. C. 2009-1860

- 3 -

- (ii) direct the Commissioner to conduct the Inquiry under the name of the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River,
- (iii) authorize the Commissioner to consider findings, as he considers appropriate, of previous examinations, investigations or reports that may have been conducted that he deems relevant to the Inquiry and to give them any weight, including accepting them as conclusive,
- (iv) direct the Commissioner to supplement those previous examinations, investigations or reports with his own investigation and to consider the Government's response to previous recommendations,
- (v) authorize the Commissioner to rent any space and facilities that may be required for the purposes of the Inquiry, in accordance with Treasury Board policies,
- (vi) authorize the Commissioner to adopt any procedures and methods that he may consider expedient for the proper conduct of the Inquiry,, to sit at any times and in any places in Canada that he decides and to conduct consultations in relation to the Inquiry as he sees fit,
- (vii) authorize the Commissioner to engage the services of any staff, experts and other persons referred to in section 11 of the Inquiries Act at rates of remuneration and reimbursement as approved by the Treasury Board,

.../4

P. C. 2009-1860

-4-

(viii) despite subparagraphs (v) and (vi), direct the Commissioner not to conduct any hearings during the periods beginning on February 12, 2010 and ending on February 28, 2010, and beginning on March 12, 2010 and ending on March 21, 2010, to minimize the costs of the Inquiry and the inconvenience to witnesses during the Vancouver 2010 Olympic and Paralympic Winter Games,

(ix) authorize the Commissioner to grant, to any person who satisfies him that they have a substantial and direct interest in the subject matter of the Inquiry, an opportunity for appropriate participation in it,

(x) authorize the Commissioner to recommend to the Clerk of the Privy Council that funding be provided, in accordance with terms and conditions approved by the Treasury Board, to ensure the appropriate participation of any person granted standing at the Inquiry under subparagraph (ix), to the extent of the person's interest, if the Commissioner is of the view that the person would not otherwise be able to participate in the Inquiry,

(xi) direct the Commissioner to use the automated documents management program specified by the Attorney General of Canada and to consult with records management officials within the Privy Council Office on the use of standards and systems that are specifically designed for the purpose of managing records,

(xii) direct the Commissioner, in respect of any portion of the Inquiry conducted in public, to ensure that members of the public can, simultaneously in both official languages, communicate with and obtain services from the Inquiry, including any transcripts of proceedings that have been made available to the public,

.../5

P. C. 2009-1860

-5-

(xiii) direct the Commissioner to follow established security procedures, including the requirements of the Policy on Government Security, with respect to persons engaged under section 11 of the Inquiries Act and the handling of information at all stages of the Inquiry,

(xiv) direct the Commissioner to perform his duties without expressing any conclusion or recommendation regarding the civil or criminal liability of any person or organization,

(xv) direct the Commissioner to submit, on or before August 1, 2010, an interim report, simultaneously in both official languages, to the Governor in Council, setting out the Commissioner's preliminary views on, and assessment of, any previous examinations, investigations or reports that he deemed relevant to the Inquiry and the Government's responses to those examinations, investigations and reports,

(xvi) direct the Commissioner to submit, on or before May 1, 2011, one or more reports, simultaneously in both official languages, to the Governor in Council, and

(xvii) direct the Commissioner to deposit the records and papers of the Inquiry with the Clerk of the Privy Council as soon after the conclusion of the Inquiry as is reasonably possible, and

(b) authorizes, pursuant to section 56 of the *Judges Act*, the Honourable Bruce Cohen of Vancouver, British Columbia, a judge of the Supreme Court of British Columbia, to act as Commissioner.

CERTIFIED TO BE A TRUE COPY—COPIE CERTIFIÉE CONFORME



CLERK OF THE PRIVY COUNCIL—LE GREFFIER DU CONSEIL PRIVÉ



CANADA

PRIVY COUNCIL • CONSEIL PRIVÉ

P. C. 2009-1861
November 5, 2009

Her Excellency the Governor General in Council, on the
recommendation of the Prime Minister, hereby

(a) pursuant to paragraph (b) of the definition

"department" in section 2 of the *Financial Administration Act*,
designates the Commission of Inquiry into the Decline of Sockeye
Salmon in the Fraser River as a department for the purposes of
that Act; and

(b) pursuant to paragraph (b) of the definition

"appropriate Minister" in section 2 of the *Financial Administration
Act*, designates the Prime Minister as the appropriate Minister with
respect to the Commission referred to in paragraph (a).

CERTIFIED TO BE A TRUE COPY—COPIE CERTIFIÉE CONFORME

A red ink signature, likely of the Clerk of the Privy Council, written in a cursive style.

CLERK OF THE PRIVY COUNCIL—LE GREFFIER DU CONSEIL PRIVÉ



CANADA
PRIVY COUNCIL • CONSEIL PRIVÉ

P.C. 2010-954
July 23, 2010

Her Excellency the Governor General in Council, on the recommendation of the Prime Minister, hereby directs that a commission do issue under Part I of the *Inquiries Act* and under the Great Seal of Canada amending the commission in relation to the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, issued pursuant to Order in Council P.C. 2009-1860 of November 5, 2009, by replacing subparagraph (xv) with the following:

(xv) direct the Commissioner to submit, on or before October 29, 2010, an interim report, simultaneously in both official languages, to the Governor in Council, setting out the Commissioner's preliminary views on, and assessment of, any previous examinations, investigations or reports that he deemed relevant to the Inquiry and the Government's responses to those examinations, investigations and reports.

CERTIFIED TO BE A TRUE COPY—COPIE CERTIFIÉE CONFORME

A handwritten signature in red ink, appearing to read "S. J. B. Carter".

CLERK OF THE PRIVY COUNCIL—LE GREFFIER DU CONSEIL PRIVÉ



CANADA
PRIVY COUNCIL • CONSEIL PRIVÉ

P.C. 2011-23
January 24, 2011

His Excellency the Governor General in Council,
on the recommendation of the Prime Minister, hereby directs
that a commission do issue under Part I of the *Inquiries Act* and
under the Great Seal of Canada amending the commission in
relation to the Commission of Inquiry into the Decline of
Sockeye Salmon in the Fraser River, issued pursuant to
Order in Council P.C. 2009-1860 of November 5, 2009, as
amended by Order in Council P.C. 2010-0954 of July 23, 2010,
by replacing paragraph (s) with the following:

(s) Our Commissioner to submit, on or before
June 30, 2012, one or more reports, simultaneously in
both official languages, to the Governor in Council;

CERTIFIED TO BE A TRUE COPY—COPIE CERTIFIÉE CONFORME

A handwritten signature in red ink, likely belonging to the Clerk of the Privy Council.

CLERK OF THE PRIVY COUNCIL—LE GREFFIER DU CONSEIL PRIVÉ



CANADA
PRIVY COUNCIL • CONSEIL PRIVÉ

P.C. 2012-340
March 27, 2012

His Excellency the Governor General in Council, on the recommendation of the Prime Minister, hereby directs that a commission do issue under Part I of the *Inquiries Act* and under the Great Seal of Canada amending the commission in relation to the Commission of Inquiry into the Decline of Sockeye Salmon in the Fraser River, issued pursuant to Order in Council P.C. 2009-1860 of November 5, 2009, as amended by Order in Council P.C. 2010-0954 of July 23, 2010 and by Order in Council P.C. 2011-23 of January 24, 2011, by replacing paragraph (s) with the following:

(s) Our Commissioner to submit, on or before September 30, 2012, one or more reports, simultaneously in both official languages, to the Governor in Council;

CERTIFIED TO BE A TRUE COPY—COPIE CERTIFIÉE CONFORME

A handwritten signature in red ink, appearing to read "W. S. Banters".

CLERK OF THE PRIVY COUNCIL—LE GREFFIER DU CONSEIL PRIVÉ



CANADA
PRIVY COUNCIL • CONSEIL PRIVÉ

P.C. 2012-1132
September 24 2012

His Excellency the Governor General in Council,
on the recommendation of the Prime Minister, directs that a
commission do issue under Part I of the *Inquiries Act* and under
the Great Seal of Canada amending the commission in relation
to the Commission of Inquiry into the Decline of Sockeye
Salmon in the Fraser River, issued pursuant to Order in Council
P.C. 2009-1860 of November 5, 2009, as amended by Order in
Council P.C. 2010-954 of July 23, 2010, by Order in Council
P.C. 2011-23 of January 24, 2011 and by Order in Council
P.C. 2012-340 of March 26, 2012, by replacing paragraph (s)
with the following:

(s) Our Commissioner to submit, on or before
October 29, 2012, one or more reports, simultaneously
in both official languages, to the Governor in Council;

CERTIFIED TO BE A TRUE COPY—COPIE CERTIFIÉE CONFORME

A handwritten signature in red ink, likely of the Clerk of the Privy Council.

CLERK OF THE PRIVY COUNCIL—LE GREFFIER DU CONSEIL PRIVÉ

Appendix B • Wild Salmon Policy



Fisheries and Oceans
Canada

Pêches et Océans
Canada

The cover of the report features a photograph of a wild Pacific salmon leaping from a rocky riverbed. The fish is in mid-air, with its body arched and its fins spread. The water is a deep blue, and the background shows a forested shoreline with trees in shades of green and yellow. The title is printed in a serif font over the right side of the image.

CANADA'S POLICY FOR CONSERVATION OF WILD PACIFIC SALMON

Canada



CANADA'S POLICY FOR CONSERVATION OF WILD PACIFIC SALMON

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in Right of Canada, 2005.

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June, 2005

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MESSAGE FROM THE MINISTER

As Canada's Minister of Fisheries and Oceans, it is my pleasure to present *Canada's Policy for Conservation of Wild Pacific Salmon*.

This policy represents the culmination of five years of consultations with Canadians concerned about the protection of Pacific salmon. It will usher in a significant new approach to the conservation of one of Canada's most valuable and cherished resources – wild Pacific salmon. Its adoption represents Fisheries and Oceans Canada's commitment to maintain healthy and diverse populations of salmon that will support sustainable fisheries now, and meet the needs of future generations.

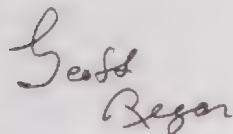
This new approach specifies clear objectives, establishes strategies to meet them, and presents a decision-making process to ensure that choices made about salmon conservation reflect societal values. The policy places conservation of salmon and their habitats as the first priority for resource management.

It gives tangible effect to this principle by committing to safeguard the genetic diversity of wild salmon, and maintain habitat and ecosystem integrity. The policy also considers the values that the harvesting of Pacific salmon provide to people. It reflects a management framework that will provide care and respect for the resource and its ecosystem, and for the people who rely on it for food and spiritual needs, for recreation, and for their livelihood.

I would like to thank the hundreds of dedicated Canadians who participated in our consultations and contributed to the completion of this policy. Their expertise, their dedication, and their passionate advocacy for the well-being of this precious resource have been of immeasurable value and have helped us to improve the policy as it was being developed.

While the adoption of this policy is a significant step, the work to secure the future of Pacific salmon is just beginning. My Department is fully committed to its implementation, but we know that full success in meeting its objectives will depend upon cooperation among all who have an interest in wild Pacific salmon. I am confident that with the sustained efforts of First Nations, fishers, environmental groups, and members of the public, we will together be able to make real and lasting change.

I look forward to working with all groups to implement this policy and secure a brighter future for salmon.



The Honourable Geoff Regan P.C. M.P.
Minister of Fisheries and Oceans

May 31, 2005



The Wild Salmon Policy – A Snapshot

- The goal of the Wild Salmon Policy is to restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity.
- This policy goal will be advanced by safeguarding the genetic diversity of wild salmon populations, maintaining habitat and ecosystem integrity, and managing fisheries for sustainable benefits.
- Conservation of wild salmon and their habitat is the highest priority for resource management decision-making.
- Resource management processes and decisions will honour Canada's obligations to First Nations.
- Implementation of this policy will involve an open and inclusive process aimed at making decisions about salmon stewardship that consider social, economic, and biological consequences. People throughout British Columbia and the Yukon will contribute to decisions that reflect society's values for wild salmon.
- Wild salmon will be maintained by identifying and managing "Conservation Units" (CUs) that reflect their geographic and genetic diversity. A CU is a group of wild salmon sufficiently isolated from other groups that, if lost, is very unlikely to recolonize naturally within an acceptable timeframe (e.g., a human lifetime or a specified number of salmon generations).
- The status of CUs will be monitored, assessed against selected benchmarks, and reported publicly. Where monitoring indicates low levels of abundance, or deterioration in the distribution of the spawning components of a CU, a full range of management actions to reverse declines – including habitat, enhancement, and harvest measures – will be considered and an appropriate response implemented.
- Measures for habitat protection and salmon enhancement will focus on sustaining wild salmon. An integrated approach to habitat management – involving assessment of habitat condition, identification of indicators and benchmarks, and monitoring of status – will be adopted that links fish production with watershed and coastal planning and stewardship initiatives.
- Ecosystem considerations will be incorporated into salmon management. Indicators will be developed to assess the status of freshwater ecosystems. Information from ocean climate studies of marine survival and of the biological condition of salmon will be integrated into the annual assessments of salmon abundance that guide salmon harvest planning.
- The policy aims to maintain CUs but recognizes there will be exceptional circumstances where it is not feasible or reasonable to fully address all risks. Where an assessment concludes that conservation measures will be ineffective or the social or economic costs to rebuild a CU are extreme, the Minister of Fisheries and Oceans may decide to limit the range of measures taken. Such a decision will be made openly and transparently.
- This policy will foster a healthy, diverse, and abundant salmon resource for future generations of Canadians. It will support sustainable fisheries to meet the needs of First Nations and contribute to the current and future prosperity of Canadians.



INTRODUCTION

Canadians on the West Coast have an enduring connection with Pacific salmon forged thousands of years ago with the arrival of the first peoples. Wild salmon serve as a vital source of food for First Nations and have a central place in their culture and spirituality; they provide jobs, income, and enjoyment for individuals, businesses, and coastal communities; and they play a key role in natural ecosystems, nourishing a complex web of interconnected species. The ties of Pacific salmon with west coast communities, people, and ecology have been eloquently described in the writings of the late Roderick Haig-Brown, who observed:

*The salmon runs are a visible symbol of life, death and regeneration, plain for all to see and share ... The salmon are a test of a healthy environment, a lesson in environmental needs. Their abundant presence on the spawning beds is a lesson of hope, of deep importance for the future of man.*¹

During the past decade, the management of Pacific salmon has become progressively more challenging for various reasons. Supreme Court decisions, varying ocean productivity, conservation concerns, habitat loss, international agreements, new Canadian legislation governing species at risk, shifts in global markets, and altered public expectations have all contributed to this dynamic operating context. The Department of Fisheries and Oceans (DFO) has adapted to changing circumstances but policy and programs must continue to be reshaped to address contemporary challenges and secure a healthy future for Canada's Pacific salmon. This document provides a blueprint for meeting these challenges – it presents Canada's policy for conservation of wild Pacific salmon.

¹ Haig-Brown (1974), *The Salmon*.

What are Wild Pacific Salmon?

The Wild Salmon Policy (WSP) addresses five species of Pacific salmon found in British Columbia and the Yukon:² *Oncorhynchus nerka* (sockeye), *O. kisutch* (coho), *O. tshawytscha* (chinook), *O. gorbuscha* (pink), and *O. keta* (chum). These species form part of the larger classification of Pacific salmonids, which include steelhead and cutthroat trout. DFO has authority under the federal *Fisheries Act* to manage Pacific salmon and their habitat. The management of steelhead and cutthroat trout has been delegated to the Province of British Columbia, though responsibility for protection of their habitat remains with the Department. The Department will co-operate with BC in the management and enhancement of these species, consistent with the WSP.

Salmon are considered "wild" if they have spent their entire life cycle in the wild and originate from parents that were also produced by natural spawning and continuously lived in the wild.

Salmon that originate directly from hatcheries and managed spawning channels are not considered wild in this policy, and are called "enhanced" salmon.

This term is sometimes also applied to salmon that originate from other enhancement activities, such as habitat restoration and lake enrichment, since their rate of production has been augmented. However, the reproduction of these fish has not been altered, and therefore they are deemed "wild" in this policy.

The requirement in the definition that a wild salmon must complete more than one full generation in the wild safeguards against potential adverse effects resulting from artificial culture.

² Wild Pacific salmon in the Northwest Territories are relatively uncommon, not actively managed, and are not included in this policy.

LEGAL CONTEXT FOR THE WILD SALMON POLICY (WSP)

Section 91 of the *Constitution Act*, 1867 assigns exclusive legislative authority over “Sea Coast and Inland Fisheries” to the federal government. The Minister of Fisheries and Oceans exercises this authority under the *Fisheries Act* and regulations. The Minister retains the authority and accountability for the protection and sustainable use of fisheries resources and their habitat. The Minister’s authority includes the discretion and powers necessary to regulate access to the resource, impose conditions on harvesting, and enforce regulations. Provincial, Territorial and municipal governments have important authorities with respect to land, water and waste disposal that need to complement efforts to conserve fish and fish habitat.



The legal context for management of wild salmon is also defined by court decisions respecting Aboriginal and treaty rights. Existing Aboriginal and treaty rights are recognized and affirmed in section 35 of the *Constitution Act*, 1982. In its 1990 decision in *R. v. Sparrow*, the Supreme Court of Canada held that the recognition and affirmation of existing Aboriginal rights in the *Constitution Act*, 1982 means that any infringement of such rights must be justified. As described in more detail in Appendix 1, DFO seeks to manage fisheries in a manner consistent with the decision of the Supreme Court of Canada in *R. v. Sparrow* and subsequent court decisions such as the decision of the BC Court of Appeal in *R. v. Jack, John and John*.

Specifically, DFO is committed to managing fisheries such that Aboriginal fishing for food, social and ceremonial purposes has priority over other fisheries.

In its 2004 decision in *Haida v. BC*, the Supreme Court of Canada concluded that the Crown has a legal duty to consult with Aboriginal groups and, depending on the strength of the claim of Aboriginal rights or Aboriginal title and the seriousness of the potential adverse effect of a decision on the claimed rights or title, accommodate their interests when the Crown has knowledge of the potential existence of an Aboriginal right or Aboriginal title and is making decisions that might adversely affect the Aboriginal right or Aboriginal title. The Court also concluded that the scope of the duty will vary depending on the circumstances.

The WSP will be implemented in accordance with the guidance provided by the courts with respect to governments’ obligations to First Nations, including the guidance provided by the Supreme Court of Canada in *Haida v. BC*, and any guidance from courts in future. The WSP will also be implemented in accordance with the Nisga’a Final Agreement, the Yukon Final Agreements, and any other treaties or agreements entered into between the federal government and First Nations.

PACIFIC SALMON AND DIVERSITY

The health of Pacific salmon depends not only on their abundance but also on their biological diversity. That diversity includes the irreplaceable lineages of salmon evolved through time, the geographic distribution of these populations, the genetic differences and life history variations observed among them, and the habitats that support these differences. Diversity of Pacific salmon represents their legacy to-date and their potential for adaptation to future changes in climate, fishing, and habitat. Protecting diversity is the most prudent policy for the future continuance of wild salmon as well as the ecological processes that depend on them and the cultural, social, and economic benefits drawn from them.

Concern for diversity in Pacific salmon emerged as a significant issue during the 1990s, along with Canada's support for the 1992 UN Convention on Biological Diversity. By 1990 in southwestern BC, one-third of the spawning locations (a species in a stream) known since the 1950s had been lost or diminished to such low numbers that spawners were not consistently monitored at these sites.³ This portion of BC is however the centre of urbanization and development and is not representative of the province as a whole. In 1996, a study for the American Fisheries Society identified 8,171 natural spawning locations throughout BC and the Yukon.⁴ The study reported that salmon had been extirpated in 2 per cent of these locations and had a high chance of extinction in another 12 per cent, based on the current numbers of spawners and/or the rate of change in those numbers. These declines in diversity are one impetus for a new management approach for wild salmon.

THE IMPORTANCE OF HABITAT AND ECOSYSTEMS

To survive and prosper, wild salmon need appropriate freshwater and marine habitat: no habitat, no salmon. Productive habitat in the Pacific Region faces growing pressures from human activities that threaten the capacity to sustain salmon populations over the long term. The land and water that comprise habitat important for salmon productivity also have significant economic value to non-fishery uses, such as urban development, forestry, agriculture, and other industries. These competing uses may compromise the value of the habitat for salmon and associated species. An ongoing concern is that habitat productivity can deteriorate as the result of many small, incremental and often unidentified impacts accumulating over time. In addition, ocean and



freshwater habitat can be affected by global-scale phenomena, such as climate change.

The roles that Pacific salmon play in marine (oceanic, coastal, and estuarine), freshwater (lake, stream, and wetland), and terrestrial ecosystems (adjacent to streams and rivers, the riparian zone) have also become a significant issue in salmon management. The acceptance of the influence of marine ecosystems on salmon survival and production has undoubtedly been one of the major advances in recent knowledge about Pacific salmonids. This policy includes actions to progressively account for ecosystem values in salmon management.

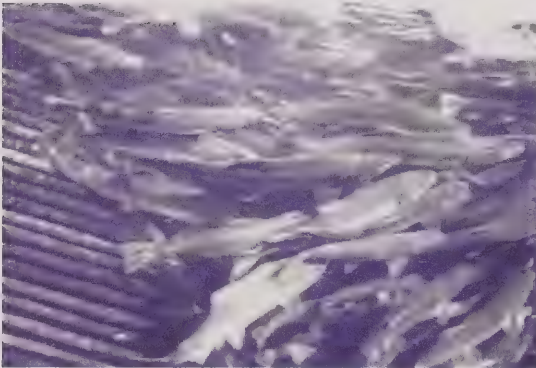
Habitat pressures will continue to grow as human populations increase and, with them, demands for space, food, and livelihood. The challenge for habitat managers is to regulate social and economic activities to avoid or mitigate adverse impacts on fish habitat, in cooperation with First Nations, Provincial, Territorial, and local governments. The new management approach needs to meet this challenge more effectively and maintain habitat and ecosystem integrity for the long-term health of Pacific salmon populations.

³Riddell (1993), "Spatial organization of Pacific salmon: What to conserve?"

⁴Slaney et al. (1996), "Status of anadromous salmon and trout in British Columbia and the Yukon." The numbers reported here exclude steelhead, which are not covered by this policy. The paper assessed trends in 4,906 combinations of species within streams (i.e. a stream with three species spawning would account for three spawning locations). The 4,906 spawning locations were 60 per cent of the total number of known locations, but the remaining 40 per cent did not have adequate data to support an assessment.

SALMON DIVERSITY AND BIODIVERSITY

The diversity in Pacific salmon described above refers to genetic variation and adaptations to different environments that have accumulated between populations of salmon. The abundance of spawning salmon is understood to be important for the future production of salmon, and it is also critical for the maintenance of genetic variation or diversity within populations, and for connectedness of populations that results from straying. A low level of straying between spawning groups provides an important source of genetic variation and allows for colonization of new habitats. In this policy, the term diversity, or salmon diversity, refers to genetic variation and adaptations within and between populations of wild Pacific salmon.



Pacific salmon are, however, part of a larger ecosystem and are components of the total biological diversity in these natural systems. In this policy, biodiversity (or biological diversity) is defined as the full range of variety and variability within and among living organisms and the ecological complexes in which they occur; and encompasses diversity at the ecosystem, community, species, and genetic levels and the interaction of

these components.⁵ The protection of biodiversity, and understanding the broader implications of this term, is also essential to implementation and success of this policy. The biodiversity associated with Pacific salmon populations will influence the quality and productivity of the salmon's ecosystems and local habitats, and determines the biological background influencing salmon diversity and their adaptability.

Canada's *Species at Risk Act* (SARA) recognizes the importance of the diversity within species by defining "wildlife species" to mean "a species, subspecies, variety or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and (a) is native to Canada; or (b) has extended its range into Canada without human intervention and has been present in Canada for at least 50 years".⁶ This policy defines the geographic or genetically distinct populations of salmon and the habitats necessary to protect their biodiversity. These groupings of salmon fit the definition of "wildlife species" in SARA.

THE WILD SALMON POLICY – A NEW MANAGEMENT APPROACH

Within the last decade, various measures have been implemented to advance the conservation of Pacific salmon. For example, the commercial fishing fleet was reduced, Canada and the United States renewed the Pacific Salmon Treaty, and selective harvesting practices have been developed and adopted. There is now a greater recognition of the role of wild salmon in Pacific Northwest ecosystems. Each of these actions, in turn, has contributed to the growth of a more informed conservation ethic for Pacific salmon, one that recognizes the inherent value of salmon, the importance of diversity among and within populations, and the obvious and enduring cultural, social, and economic benefits.

⁵1992 UN Convention on Biological Diversity; and Noss (1990), "Indicators for monitoring biodiversity."

⁶SARA, subsection 2.1., available at www.sararegistry.gc.ca/the_act/default_e.cfm.

Although progress has been made in salmon conservation, there are continuing challenges for some wild populations, their ecosystems, and the people that rely on them. For example, three distinct groups – Interior Fraser River coho, Cultus Lake sockeye in the Lower Fraser, and Sakinaw Lake sockeye in the Strait of Georgia – were designated as Endangered by COSEWIC. There has been an increasing awareness that past management of large fisheries and “stocks” has failed to adequately protect or recognize the value of diversity in Pacific salmon. A new approach to managing salmon production and diversity is needed to conserve salmon and protect and restore the full array of benefits they provide to Canadians.

The impetus for a new management approach also comes from the evolution in public attitudes, science, laws and decision-making over the past twenty years. Thousands of volunteer streamkeepers and many local watershed groups now actively protect and restore Pacific salmon and habitat. Biologists are learning more about the genetic diversity of wild salmon, the impact of climate on survival, and the relationship of salmon to their habitat and surrounding ecosystems. The *Species at Risk Act* mandates the protection of geographically or genetically distinct populations with a high probability of extinction, while the *Oceans Act* calls for integrated resource management and an ecosystem perspective. First Nations governments and non-governmental organizations are demanding more involvement in decisions about wild salmon.

Expectations for the management of Pacific salmon today require a more proactive, forward-looking approach that sets clear conservation goals and acknowledges the importance of protecting biodiversity for sustaining diverse healthy wild salmon populations, their habitats, and associated benefits. Together with the enjoyment wild salmon provide, their place in our cultural identity, and the expectations of Canadians for responsible stewardship, these factors make a compelling case



for a new policy approach. The Wild Salmon Policy takes account of consultations with First Nations, user groups, and the general public on draft discussion papers released in 2000, 2004, and early 2005.⁷

The policy that follows will guide future decisions to conserve wild salmon and their habitat in BC and the Yukon. It neither amends nor overrides existing legislation or regulations, but will serve as the blueprint that will govern how these statutory authorities will be implemented.

This policy will facilitate an adaptive approach to salmon conservation in BC and the Yukon. By choice, decision-making is achieved through an inclusive process, rather than through the establishment of a set of predetermined rules. The policy defines objectives and describes conservation outcomes, but it does not prescribe decision rules that would restrict its application. This approach is well-suited to dealing with the circumstances that pertain to salmon. Choices about conservation will be made openly, with input

⁷DFO (2000), *The Wild Salmon Policy Discussion Paper*; Dovetail Consulting Inc. et al (2000), *Final Report on Consultations for the Wild Salmon Policy Discussion Paper and the Salmonid Enhancement Program: Analysis of Input from Provincial Stakeholder Group Meetings, Community Forums, Response Forms and Submissions*; and DFO (2004a), *A Policy Framework for Conservation of Wild Pacific Salmon (Draft)*.

from First Nations, and local and region wide stakeholder groups, to ensure that decisions reflect societal values. Management of wild salmon and their habitat is complex, and the problems encountered are diverse. It is not feasible to design rules that anticipate and adequately address all eventualities that will be encountered. A deterministic approach is inflexible, can eliminate the exercise of judgement, and may result in the wrong solution, or impose significant unnecessary costs. The approach adopted in this policy avoids these problems, and offers increased opportunities for the consideration of alternatives, such as habitat initiatives, to assist in addressing protection and rebuilding of salmon. Finally, the approach selected is compatible with the *Fisheries Act*, and consistent with the principle of Ministerial discretion.



POLICY FOR THE CONSERVATION OF WILD PACIFIC SALMON

This policy describes how DFO will meet its responsibilities for the conservation of wild Pacific salmon. It stipulates an overall policy goal for wild salmon, identifies basic principles to guide resource management decision-making, and sets out objectives and strategies to achieve the goal (Figure 1).

The successful implementation of this policy will provide Canadians with:

- Healthy, diverse, and abundant wild salmon populations for future generations;
- Sustainable fisheries to meet the needs of First Nations and contribute to the current and future prosperity of all Canadians; and
- Improved accounting for ecosystem values in salmon and habitat management decisions.

Important Terminology: Conservation and Sustainable Use

The intent of this policy is to provide a framework for the conservation and sustainable use of wild Pacific salmon. These terms – “Conservation” and “Sustainable Use” mean different things to different people. Some definitions of conservation include sustainable use, implying that protection of the biological processes and use of resources are both components of conservation. Other definitions, such as in the Convention on Biological Diversity, separate the two concepts, and present them as related, but distinct considerations. In this policy, these terms are differentiated.

Conservation is the protection, maintenance, and rehabilitation of genetic diversity, species, and ecosystems to sustain biodiversity and the continuance of evolutionary and natural production processes.⁸

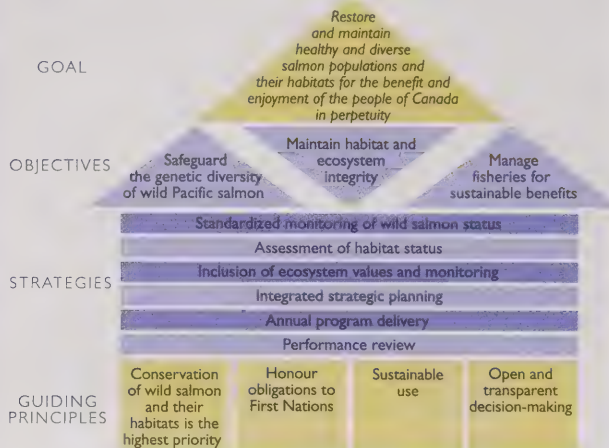
This definition identifies the primacy of conservation over use, and separates issues associated with constraints on use from allocation and priority amongst users.

Sustainable Use is the use of biological resources in a way and at a rate that does not lead to their long term decline, thereby maintaining the potential for future generations to meet their needs and aspirations.

As a resource management agency, DFO is committed to the sustainable use of wild salmon resources. The intent of this policy is to protect the biological foundation of wild Pacific salmon to provide the fullest benefits presently and for future generations. In the long term, protection of biodiversity will provide the greatest opportunity for maintaining sustainable benefits to Canadians.

⁸See Shuter et al. (1997), “Reply: Toward a definition of conservation principles for fisheries management.” Grumbine (1994), “What is ecosystem management?” Mangel et al. (1996), “Conservation of wild living resources,” and Olver et al. (1995), “Toward a definition of conservation principles for fisheries management.”

Figure 1 Overview of the Wild Pacific Salmon Policy



GOAL AND GUIDING PRINCIPLES

The goal of the Wild Salmon Policy is to restore and maintain healthy and diverse salmon populations and their habitats for the benefit and enjoyment of the people of Canada in perpetuity.

All decisions and activities pertaining to the conservation of wild Pacific salmon will be guided by four principles:

► Principle 1 Conservation.

Conservation of wild Pacific salmon and their habitats is the highest priority in resource management decision-making.

The protection and restoration of wild Pacific salmon and their habitats will enable the long-term health and productivity of wild populations and continued provision of cultural, social and economic benefits. To safeguard the long-term viability of wild Pacific salmon in natural surroundings, the Department will strive to maintain healthy populations in diverse habitats.

► Principle 2 Honour obligations to First Nations.

Resource management processes and decisions will honour Canada's obligations to First Nations.

This includes Canada's legal duty to consult with First Nations and, depending on the strength of the claim of Aboriginal rights or Aboriginal title and the seriousness of the potential adverse effect of a decision on the

claimed rights or title, accommodate their interests when Canada has knowledge of the potential existence of an Aboriginal right or Aboriginal title and is making decisions that might adversely affect the right or title. Resource management processes and decisions will also be in accordance with the Nisga'a Final Agreement, the Yukon Final Agreements, and any other treaties or agreements entered into between Canada and First Nations.

► Principle 3 Sustainable Use.

Resource management decisions will consider biological, social, and economic consequences, reflect best science including Aboriginal Traditional Knowledge (ATK), and maintain the potential for future generations to meet their needs and aspirations.⁹

Social, economic, and biological considerations will inform decisions on salmon, their habitats, and their ecosystems consistent with the priorities assigned to Principles 1 and 2. Conservation decisions cannot be based solely on biological information. The maintenance of biodiversity and healthy ecosystems must be considered in the context of human needs for use now and in the future. Decisions will not be taken without regard to their cost or social consequences.

► Principle 4 Open Process.

Resource management decisions will be made in an open, transparent and inclusive manner.

To gain broad public support for decision-making, salmon management must accommodate a wide range of interests in the resource. Decisions about salmon protection and sustainable use will be based on meaningful public input to ensure they reflect society's values. Decision-making processes will be transparent and governed by clear and consistent rules and procedures.

OBJECTIVES

To achieve the outcome expressed in the policy goal for wild salmon, three objectives must be fulfilled:

1. Safeguard the genetic diversity of wild Pacific salmon;
2. Maintain habitat and ecosystem integrity; and
3. Manage fisheries for sustainable benefits.



Key considerations associated with each of these objectives are described below.

► Objective 1 Safeguard the genetic diversity of wild Pacific salmon

To sustain Pacific salmon and their associated benefits, it is necessary to safeguard their geographic and genetic diversity and their habitats. While maintaining diversity is broadly accepted as essential for the health of wild salmon, the significant scientific and policy issue is how much diversity? The genetic diversity of a species includes

⁹Brundtland (1987), *Our Common Future: The World Commission on Environment and Development*, and Environment Canada (1995), *Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity*.

10 Wild Salmon Policy

The Population Structure of Wild Salmon

Salmon have a complex hierarchical population structure extending from groups of salmon at individual spawning sites all the way up to taxonomic species. Their precise homing to natal streams and their death after spawning restrict gene flow among fish at different spawning locations. However, since some salmon stray, genetic exchange also occurs among fish from different persistent spawning sites (demes) in a geographic area. These interactions form a geographic network of demes and the basic level of genetic organization in Pacific salmon.

The likelihood of genetic exchange decreases with increased distance between streams, or with greater physical differences between streams. Fewer strays and less genetic mixing result in less genetic similarity between fish in these streams. Eventually, as distance or environmental differences grow to severely limit gene flow, the spawning groups will function as separate lineages. These independently functioning aggregates are defined as **Conservation Units** in this policy.

Between localized demes and the geographic boundary of a CU are usually intermediate groupings called **Populations**. A population is a group of interbreeding salmon that is sufficiently isolated (i.e., reduced genetic exchange) from other populations such that persistent adaptations to the local habitat can develop over time. Local adaptations and genetic differences between populations are an essential part of the diversity needed for long-term viability of Pacific salmon. A CU will contain one or more populations (see Figure 2).

every individual fish. Preserving maximum genetic diversity would eliminate human harvesting of salmon and prohibit human activities that might harm salmon habitat. Conversely, to maintain a taxonomic species, such as sockeye salmon, but ignore within-species population structure would reduce diversity and contravene the intent of the UN Convention on Biological Diversity, SARA and the intent of this policy.

DFO intends to maintain diversity through the protection of "Conservation Units" (CUs). A CU is a group of wild salmon sufficiently isolated from other groups that, if extirpated is very unlikely to recolonize naturally within an acceptable timeframe, such as a human lifetime or a specified number of salmon generations.

There are important implications to this definition of a Conservation Unit. The persistence of salmon within the CU, and its associated production, demand responsible management of its population structure and habitats, as well as the ability of fish to move among habitat areas (connectivity). The loss of a CU for the length of a human lifetime would clearly have serious consequences for the people and other ecosystem components that benefit from or depend on it.

Over the geographic area of a CU, variations in habitat type and quality may result in differences in salmon productivity. Such differences in nature mean that not all populations within a CU are likely to be maintained at equal levels of production or chance of loss. Maintaining CUs requires protecting populations and demes, but not necessarily all of them, all of the time. As long as networks of connected demes and streams within CUs are maintained, any loss of a localized spawning group should be temporary. Maintaining healthy abundances within CUs requires sufficient spawning salmon to recolonize depleted spawning areas and protection of fish habitat to support production and provide connection between localized spawning groups. While salmon from neighboring demes or populations are unlikely to be genetically identical to those lost, they are likely to be most similar genetically and share many adaptive traits. Such localized losses, whether due to natural events or human activities, would not result in extirpation of the CU.

Total success in safeguarding the genetic diversity of wild Pacific salmon would imply preserving all populations and CUs. Action Steps in the WSP are prescribed to maintain CUs to the fullest extent possible, but there will likely be circumstances when losses of wild salmon are unavoidable. Catastrophic events are beyond human control and the Department may not be able to restore habitat or spawning demes damaged by such events. The rate of climate change in an area may exceed the ability of some salmon populations to adjust. While it is the clear intent of this policy to prevent losses resulting from management and use, it is unrealistic in natural environments to expect all losses can be avoided.

Conservation Units and the Maintenance of Diversity

Diversity in Pacific salmon reflects genetic and habitat diversity and the evolution of lineages of salmon over thousands of years¹⁰. These precise lineages cannot be replaced once lost, and the more numerous they are the greater the chances for salmon to adjust to future environmental changes. Diversity is a kind of insurance that reduces the risk of loss by increasing the likelihood that species and populations will be able to adapt to changing circumstances and survive. Furthermore, maintaining the largest number of spawning populations that are adapted to their individual habitats will result in higher abundances of salmon.

Biologists still have much to learn about the importance of local adaptations at the stream level, the rate at which salmon adapt, and the value of biodiversity. However, since no one can foresee the future stresses on wild salmon, a responsible and precautionary approach recommends conserving a wide diversity of populations and habitats. Pacific salmon have been diverse and adaptable enough to survive floods and drought, disease, volcanic eruptions, and ice ages. Their survival strategies should continue to serve them in the future, unless human-caused pressures become insurmountable. We must ensure that these survival strategies are allowed to function and not destroyed by our growing human footprint.

Some CUs will encompass large areas and include many streams and localized spawning groups. Concerns have been expressed that for such large CUs, individual streams and spawning groups may not be adequately protected even if they are important to local communities. All local demes and streams have value. In practice, protecting entire CUs with their networks of spawning groups is the most effective way to protect individual spawning groups and the interests of local communities.

These networks provide the natural process for recolonizing streams and salmon habitat (with similar genetically related salmon) that may be lost through natural events or some human impact. For example, if attention is focused on a local stream and the overall well-being of the CU is not maintained, then the stream of interest may become isolated from other spawning groups, and at greater risk of loss, through habitat loss or reduced abundances in neighboring streams. The critical assumption underlying these processes, however, is the protection and maintenance of functioning habitat and ecosystems within the CU.

The desired number of spawners for a CU will be established to provide for an adequate abundance and distribution of salmon throughout its geographic range. The annual status of the CU in relation to these targets will guide the development of harvest management plans in the integrated planning process (Strategy 4).

¹⁰For further reading on biodiversity and Pacific salmon, see for example: Greer and Harvey (2004), *Blue Genes: Sharing and Conserving the World's Aquatic Biodiversity*; Gallagher and Wood (2004), *The World Summit on Salmon: Proceedings*; Hilborn et al. (2003) "Biocomplexity and fisheries sustainability;" Harvey (2002), *Biodiversity and Fisheries: A Primer for Planners*; Wood (2002), *Managing biodiversity in Pacific salmon: The evolution of the Skeena River sockeye salmon fishery in British Columbia*; Harvey et al. (1998), *Action before extinction: an international conference on conservation of fish genetic diversity*; Wood and Holtby (1998), "Defining conservation units for Pacific salmon using genetic survey data;" and Levin and Schiewe (2001), "Preserving salmon biodiversity."

Species Differences in Conservation Units

(see Figure 2)

The number and sizes of CUs will vary among species. For instance, pink and chum salmon generally show fewer genetic differences between populations and demes than the other species. Consequently, their CUs will be relatively large. Similarly, coho rarely exhibit marked genetic boundaries, so their CUs will tend to be large and at times somewhat difficult to define. Coho show, however, substantial life history variation (e.g., lake rearing juveniles, fry migrants, run timing variation) within a region. Chinook salmon also show varied life histories, but the differences tend to be more geographically aligned, and so will probably have more CUs than coho. Sockeye CUs are probably easiest to identify and will be the most numerous. Genetic information strongly suggests that sockeye CUs will typically be at the level of an individual sockeye-rearing lake. In some cases though, it may turn out that several small sockeye lakes will constitute one CU, or that different timing components ("runs") within large lakes may represent separate CUs. The delineation of CUs in all species will be based on biological information including genetic variation, phenotypic traits (e.g., run timing, life history traits, ocean distribution, etc.), and aboriginal traditional knowledge (ATK) if available. Delineations of CUs are expected to change over time as more information and experience is gained.

Figure 2 Schematic representation of genetic diversity and Conservation Unit structure

Taxonomic Species	<i>O. nerka</i> (sockeye)	<i>O. kisutch</i> (coho)	<i>O. tshawytscha</i> (chinook)	<i>O. gorbuscha</i> (pink)	<i>O. keta</i> (chum)
Conservation Units	~100 CUs in B.C. & Yukon of which 20–25 CUs are in Fraser of which Chilko Lake is one Fraser CU	~15 CUs in B.C. & Yukon of which 2 CUs are in Fraser of which Interior Fraser is one Fraser CU	~30 CUs in B.C. & Yukon of which ~6 CUs are in Fraser of which South Thompson is one Fraser CU	~25 CUs in B.C. & Yukon of which 2–3 CUs are in Fraser of which lower Fr. odd year pinks are one Fraser CU	~15 CUs in B.C. & Yukon of which Fraser chum is one CU
Populations	Chilko Lake is a population and a CU	5 populations in Interior Fraser CU	2 populations in South Thompson CU	~15 populations in lower Fraser odd year CU	~8 populations in Fraser CU
Demes	3 spawning locations in Chilko Lake CU	Spawning sites in ~200 streams in Interior Fraser CU	Spawning sites in ~15 rivers in South Thompson CU	Spawning sites in ~45 streams in lower Fraser odd year CU	Spawning sites in ~115 streams in Fraser CU
Geographic Range					

► Objective 2 Maintain habitat and ecosystem integrity

The health and long-term well-being of wild Pacific salmon is inextricably linked to the availability of diverse and productive freshwater, coastal, and marine habitats. Moreover, Pacific salmon have a critical function in the aquatic and terrestrial ecosystems sustained by these habitats. Salmon play an important role in marine ecosystems, with their bodies and waste products providing nutrients for organisms from microbes to top predators, such as killer whales. In freshwater ecosystems, returning salmon transport marine-derived nutrients inland. Salmon carcasses sustain aquatic and terrestrial animals and provide nutrients to the entire ecosystem including subsequent generations of wild salmon.

Aquatic habitats and their adjacent terrestrial areas are also valued for a wide range of human requirements. The integrity of salmon habitat is challenged by human competition for accessible land and fresh water, for ocean spaces, and for the interconnecting estuarine and coastal areas. In both freshwater and marine areas, human activities affect water quality. In estuaries and the marine foreshore, development can affect wild salmon during critical rearing and migration periods. In the open ocean, activities such as commercial fishing, shipping, and waste disposal among others can potentially affect the marine habitat of salmon.

Identifying, protecting, restoring and rehabilitating aquatic habitats are critical to maintaining their integrity and sustaining ecosystems. Since 1986, DFO's Habitat Management Program has been guided by the "no net loss" principle for the protection of these habitats.¹¹ The first and preferred approach is prevention of habitat loss. DFO policy also stipulates that where a harmful alteration of habitat is authorized by the Minister, losses shall be compensated by habitat replacement.

The strategies for achieving "no net loss" have focused primarily on project-by-project review, mainly in freshwater environments. A modern, more effective approach to achieve "no net loss" must assess the importance of habitat on an ecosystem basis, and balance the degree and type of impact with the most effective remedy. In evolving to a more integrated approach, the Department will make greater use of indicators to assess and monitor the health of freshwater and marine habitat.

A new focus on the salmon habitat that is most productive, limiting, or at risk in a CU will clarify decision-making and better link habitat management strategies to harvest and salmon assessment (Strategy 4). Low risk activities, where measures to avoid or mitigate impacts are well understood, will be dealt with through other mechanisms such as guidelines and standards. This approach will ensure that all habitats are addressed and resources are focused where most required.

In order to effectively manage and protect aquatic systems where the productive capacity of habitat is at highest likelihood of loss, DFO must integrate its work with that of Provincial and other federal agencies, First Nations governments, stewardship groups, industry, and stakeholders. Environment Canada has primary responsibility for administering, on behalf of the Minister of Fisheries and Oceans, pollution prevention and control authorities contained in the *Fisheries Act*. However, the jurisdiction for many of the land and water uses that may be detrimental to salmon resides with Provincial, Territorial or local governments. Success in protecting and restoring habitat demands a cooperative and collaborative approach among the various levels of government so that land and water use activities and decisions better support the needs of salmon. One such coordinating structure is the Pacific Council of Fisheries and Aquaculture Ministers and its subsidiary work groups. The council and the work groups can provide an organizational arrangement within which information can be shared and cooperative work developed and coordinated. Collaborative approaches such as this optimize the use of our collective resources.

Linking Habitat to Wild Salmon CUs and Fish Harvest Planning

A key response of the regional Habitat Management Program to the WSP is an increased emphasis on integrated planning. Fish production and harvest objectives for wild salmon CUs will be linked to the conservation, restoration, and development of fish habitat.

At the resource planning level, better habitat protection priorities will be established by integrating habitat requirements with the fisheries resources they support and with fish management objectives. Habitat plans will incorporate knowledge of the current and future demands on the environment and the aquatic resources, and will be aligned with objectives for fisheries and watersheds for priority CUs.

¹¹DFO (1986), *Policy for the Management of Fish Habitat*.

► Objective 3 Manage fisheries for sustainable benefits

The conservation of wild salmon and their habitat is the highest priority in this policy. However, a policy that failed to consider the values that the harvesting of Pacific salmon provide to people would be incomplete. While everyone supports conservation, many people depend on salmon for their social and economic needs and insist on a balanced policy that provides for sustainable use of wild salmon.



DFO has a responsibility to provide sustainable harvesting opportunities that will best meet its obligations to First Nations, contribute to social well-being, and provide employment and other economic benefits to individuals and fisheries-dependent communities. A significant challenge for this policy is to safeguard the genetic diversity of salmon while accounting for and realizing these benefits of the salmon catch. Since harvest restrictions necessary to conserve the wild salmon resource affect communities and individuals, cultural, social and economic impacts need to be considered.

Some critics will suggest that consideration of the social and economic benefits arising from salmon harvesting will compromise salmon conservation. Others will claim that a focus on maintaining diversity means the elimination of major salmon fisheries. In reality, the interests of both salmon and people need to be accounted for

in a successful conservation program. This policy reflects a management framework that can provide care and respect for a resource and its ecosystem and for the people within it. Protecting the resource base provides the maximum potential for benefits to people. The full measure of the WSP's success will be the achievement of salmon conservation accompanied by human well-being.

Making the best decisions on salmon conservation cannot be done by scientists or other technical specialists alone. While choices must certainly be informed by scientific and technical information, the best decisions will ultimately reflect public values. This requires structured processes that: (1) establish specific objectives and priorities, and (2) allow the biological, social and economic consequences of different conservation measures and activities to be considered and weighed in an open and transparent way.

First Nations, harvesters, environmental groups, and community interests in the resource need to be engaged directly in these processes, and in the determination of the most appropriate management actions. Individual and community involvement in salmon management decision-making, in turn, will sustain the social and cultural ties between people and salmon. These ties will ultimately lead to the more successful implementation of conservation plans and the better protection of wild salmon.

STRATEGIES AND ACTION STEPS

This policy will be implemented through six strategies summarized in Table 1. Strategies 1 through 3 provide the information on wild salmon populations, their habitats, and ecosystems required as information for decision-making and planning. Strategy 4 requires the integration of biological, social, and economic information to produce long-term strategic plans for salmon and habitat management for each conservation unit. Strategy 5 is the translation of strategic plans into annual operational plans and Strategy 6 is a commitment to ongoing review of the implementation and success of the Policy.

The WSP and the Precautionary Approach

Article 6.2: "States shall be more cautious when information is uncertain, unreliable or inadequate. The absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures."

Article 6.2 of the UN Agreement (Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, 1995)¹² builds from the original declaration of a precautionary approach (Principle 15, Rio Declaration on Environment and Development, 1992), and is also included in the United Nations Fisheries and Agriculture Organization Code of Conduct for Responsible Fisheries (1995).

Precautionary approaches are now widely applied in fisheries management and the protection of marine ecosystems. The approach identifies important considerations for management: acknowledgement of uncertainty in information and future impacts and the need for decision making in the absence of full information. It implies a reversal in the burden of proof and the need for longer term outlooks in conservation of resources.

The application of precaution in the WSP will follow the guidance provided to Federal Departments by the Privy Council Office publication¹³ entitled "A Framework for the Application of Precaution in Science-based Decision Making About Risk." (Canada, Privy Council Office 2003). That Framework includes five principles of precaution:

- The application of the precautionary approach is a legitimate and distinctive decision-making approach within a risk management framework.
- Decisions should be guided by society's chosen level of risk.
- Application of the precautionary approach should be based on sound scientific information.
- Mechanisms for re-evaluation and transparency should exist.
- A high degree of transparency, clear accountability, and meaningful public involvement are appropriate.

The WSP will adhere to the use of precaution and be consistent with the Privy Council Office framework and FAO¹⁴ (1995, paragraph 6 (a-h)). For example, the introduction of a lower benchmark (Strategy 1) is a significant precautionary step in the conservation of Pacific salmon. In determining the value of the benchmark, all sources of uncertainty in assessment of the CU must be determined (for estimation of the buffer) and the Department and advisors must determine a risk tolerance to be applied in a risk management framework. Where assessment information is highly uncertain, more precautionary lower benchmarks will be defined.

¹²See www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm.

¹³Canada Privy Council Office (2003), *A Framework for the Application of Precaution in Science-based Decision-Making About Risk*.

¹⁴See FAO (1995), *Precautionary approach to fisheries; Part 1: Guidelines on the precautionary approach to capture fisheries and species introductions*.

Table 1 WSP strategies and action steps

1. Standardized monitoring of wild salmon status	
• Identify Conservation Units	
• Develop criteria to assess CUs and identify benchmarks to represent biological status	
• Monitor and assess status of CUs	
2. Assessment of habitat status	
• Document habitat characteristics within CUs	
• Select indicators and develop benchmarks for habitat assessment	
• Monitor and assess habitat status	
• Establish linkages to develop an integrated data system for watershed management	
3. Inclusion of ecosystem values and monitoring	
• Identify indicators to monitor status of freshwater ecosystems	
• Integrate climate and ocean information into annual salmon management processes	
4. Integrated strategic planning	
• Implement an interim process for management of priority CUs	
• Design and implement a fully integrated strategic planning process for salmon conservation	
5. Annual program delivery	
• Assess the status of Conservation Units and populations	
• Plan and conduct annual fisheries	
• Plan and implement annual habitat management activities	
• Plan and implement annual enhancement activities	
6. Performance review	
• Conduct post-season review of annual workplans	
• Conduct regular reviews of the success of the WSP	

STRATEGY 1 STANDARDIZED MONITORING OF WILD SALMON STATUS

This policy requires a systematic process to organize all Pacific salmon streams and lakes into geographic units for conservation and specification of the means to monitor abundance and distribution of Pacific salmon within those units over time. The following Action Steps present how the Department will identify and assess wild salmon in BC and the Yukon in cooperation with First Nations and others.

► Action Step 1.1. Identify Conservation Units.

Based on science and local knowledge, the salmon that use particular freshwater habitats will be aggregated into Conservation Units. CUs will be delineated consisting of one or more genetically similar interbreeding populations and have a defined geographic distribution. A CU will include

genetically similar lineages of fish, a spatial distribution of populations and demes, and be dependent on a set of habitats. This linkage recognizes the need for interconnected spawning populations for genetic processes, defines important habitat for these lineages and for future production, and identifies the groups of salmon whose status will be measured under this policy.

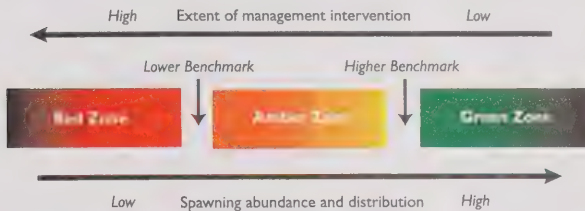
The delineation of CUs will be based on biological information, including genetic traits (e.g., DNA variants), polygenic traits (e.g., run timing, life history traits, ocean distribution, etc.), and ATK where available. Since the requirements and needs of First Nations and others may be at finer geographic scales than some CUs, management objectives to address these may be recognized in Strategic plans (Strategy 4). The number of CUs for each species will be a function of our knowledge base and is expected to change over time. DFO will consult with local First Nations in accordance with its consultation obligations during the process of defining Conservation Units. As this work proceeds, it will be assessed through peer review (via the Pacific Scientific Advice Review Committee, PSARC).¹⁵ This review process facilitates participation by outside experts, First Nations, fisheries stakeholders, and the public; and will provide the means to modify the definition of CUs over time.

► Action Step 1.2. Develop criteria to assess CUs and identify benchmarks to represent biological status.

The biological status of a CU will normally be based on the abundance and distribution of spawners in the unit, or proxies thereof. When a CU contains more than one population, it will be necessary to determine how abundance is distributed among the populations. For each CU, higher and lower benchmarks will be defined that will delimit three status zones: Green, Amber, and Red (Figure 3). As spawner abundance decreases, a CU moves towards the lower status zone, and the extent of management intervention for conservation purposes will increase.

¹⁵See www.sci.pac.dfo-mpo.gc.ca/sci/psarc/default_e.htm.

Figure 3 Benchmarks and biological status zones to be determined for each CU



Benchmarks identify when the biological production status of a CU has changed significantly, but do not prescribe specific restrictions. Changes in status will initiate management actions (see sidebar). The specific responses will vary among species, geographic regions and cause of the decline and will be determined through the integrated planning process described in Strategy 4. The use of status zones and generic methods to determine benchmarks recognizes variability in data quality and quantity and is consistent with current management approaches adopted by other agencies.¹⁶

The lower benchmark between Amber and Red will be established at a level of abundance high enough to ensure there is a substantial buffer between it and any level of abundance that could lead to a CU being considered at risk of extinction by COSEWIC. The buffer will account for uncertainty in data and control of harvest management. There is no single rule to use for determination of the lower benchmark. Rather, it will be determined on a case-by-case basis, and depend on available information, and the risk tolerance applied. The determination of the risk tolerance to apply is a value judgement that requires consultation with First Nations and others affected by this choice.

Example criteria, depending on the species and types of information, may be:¹⁷

- The spawning escapement required to produce a percentage of the maximum juvenile abundance (say 10–25%);
- The spawning escapement estimated to permit recovery with an agreed probability within an acceptable period of time (e.g., 75% confidence within three salmon generations);

¹⁶Mace et al. (2003), *Report of the NMFS National Standard 1 Guidelines Working Group*, and DFO (2004b), *Proceedings of the National Meeting on Applying the Precautionary Approach in Fisheries Management*.

¹⁷The values presented in these example criteria are for explanation only and do not limit any consideration of other values or other criteria that may be determined for a specific CU.

Biological Status Zones and Management Response

A Conservation Unit in the Red zone is undesirable because of the risk of extirpation, and the loss of ecological benefits and salmon production. The presence of a CU in the Red zone will initiate an immediate consideration of ways to protect the fish, increase their abundance, and reduce the potential risk of loss. Biological considerations will be the primary drivers for the management of CUs with Red status.

Amber status implies caution in the management of the CU. While a CU in the Amber zone should be at a low risk of loss, there will be a degree of lost production. Still, this situation may result when CUs share risk factors with other more productive units. Decisions about the conservation of CUs in the Amber zone will involve broader consideration of biological, social, and economic issues. Assuming a CU is assessed to be safe in the Amber zone (consistent with Principle 1), then the use of this CU involves a comparison of the benefits from restoring production versus the costs arising from limitations imposed on the use of other CUs to achieve that restoration.

Social and economic considerations will tend to be the primary drivers for the management of CUs in the Green zone, though ecosystem or other non-consumptive use values could also be considered.

- The abundance and distribution of spawners within a CU sufficient to provide confidence that the CU does not have a high probability of extirpation (e.g., <5% chance of loss over 50 years); or
- A proportion of the number of spawners (S) estimated necessary to provide maximum sustained yield (MSY) on an average annual basis given existing environmental conditions (e.g., 25 per cent of S_{msy}).



Within the Red zone, there will be a level of abundance that cannot sustain further mortalities due to fishing or change to freshwater or marine habitats. Further mortality in such a CU will lead to continued decline in the spawner abundance and an increasing probability of extirpation. Determining this level in the zone is a continuing discussion in salmon assessment literature and is not specified in this policy. The Department will prepare and publish operational guidelines on the estimation of this level. The management response to this level will be determined on a case by case basis, in consultation with First Nations, and others affected by this determination.

The higher benchmark between Green and Amber will be established to identify whether harvests are greater or less than the level expected to provide, on an average annual basis, the maximum annual catch for a CU, given existing environmental conditions. This level will vary through time but there would not be a high probability of losing

the CU. As with the lower benchmark, the upper benchmark will also be determined on a case-by-case basis depending on the species and types of information available, and may apply:

- A proportion of the number of spawners (S) estimated necessary to provide maximum sustainable yield (MSY) on an average annual basis given existing environmental conditions (e.g., S_{msy});
- An exploitation rate for the CU that would limit harvest based on a rate of fishing mortality rather than the number of fish killed;
- The number of smolts (or spawners) estimated to correspond with habitat capacity; or
- A proportion of the long term average spawning abundance.

► Action Step 1.3.

Monitor and assess status of CUs.

Salmon assessment involves the use of various analyses to make quantitative predictions about the reaction of a population to alternative management plans.¹⁸ Two important components of this statement are that assessments should be quantitative and are conducted to provide advice for management (including conservation when necessary). For wild salmon in the BC and Yukon, however, quantitative assessment is a complex and potentially costly task, involving numerous data sources and hundreds of populations. Consequently, the Department has utilized three levels of annual monitoring programs in the assessment of Pacific salmon:

- i) **Indicator systems:** Comprehensive programs involving quantitative information on the spawning adults, juveniles produced, mature progeny produced (reported in the catch and spawning numbers) from the specific system. These programs are the most information rich and expensive but provide critical information for management such as productivity and sustainable rates of

¹⁸See Hilborn and Walters (1992), *Quantitative fisheries stock assessment*.

exploitation (population dynamic values), survival rates for major life history phases (e.g., freshwater and marine survival), and exploitation patterns and rates in fisheries.

ii) **Intensive monitoring:** Annual surveys of the numbers of salmon in specific subsets of streams or habitats within a geographic area. These surveys involve quantitative designs that can be replicated annually to provide consistent indices of spawners between years. The accuracy and precision of the estimates will vary with methodologies and habitats but the essential component is that there is a high degree of confidence that inter-annual trends are accurately assessed. For example, methods may involve in-river test fisheries, counting weirs, mark-recapture programs, area-under-the-curve estimators, and surveys of juvenile production in streams and lakes.

iii) **Extensive monitoring:** Surveys that are generally the least expensive but enable the broadest coverage of streams or other habitats within a geographic area. These surveys are useful for examining salmon distribution, consistency of patterns throughout the region, and checks on habitat changes. They are usually visually based, may be repeated within a year, and may include randomly selected samples of the streams or habitats in a large geographic area. Examples of these surveys are over-flights, stream walks or floats, and could involve only portions of a stream instead of the entire system.

For each CU, a statistically based and cost effective monitoring plan will be designed and will build on existing programs and local partnerships (e.g., First Nations agreements, local Streamkeeper or enhancement groups). Monitoring programs must assess the annual abundance of the CU and the distribution of spawners. The assessment procedures applied will vary between CUs but monitoring plans for each CU will be documented and information reported annually. The benchmarks specified for a CU must be stated in units consistent



with the monitoring program for that CU in order that the annual status of the CU can be assessed. A core program (i.e., an agreed minimum monitoring plan) will be established by the Department and partners and funded annually to maintain the long-term information fundamental to management of local salmon resources. Each monitoring plan will be peer reviewed to ensure application of appropriate designs and methods, best use of available resources for monitoring, and to ensure that information management systems have been developed. A key objective of these monitoring programs will be to make certain that data collected are utilized and timely for the provision of advice.

Assessment results for a CU compared to its two benchmarks will determine the biological status of the CU. This status determination will help to guide resource management planning and further stock assessment activities. When a CU is in the Green zone, a detailed analytical assessment of its biological status will not usually be needed. For a CU in the Amber zone, a detailed assessment may be necessary as input to Strategies 2 and 3 below. If the CU is classified as Red, a detailed assessment will normally be triggered to examine impacts on the CU of fishing, habitat degradation, and other human factors, and evaluate potential for restoration.

STRATEGY TWO ASSESSMENT OF HABITAT STATUS

The maintenance of sound, productive salmon habitat in both fresh water and the marine environment depends on good scientific information, timely measures to prevent habitat disruption, and compliance with regulatory directives. Habitat management and protection require identification of the habitats necessary for the conservation of wild salmon and assessment of changes in their status over time. This will enable the evaluation of the effectiveness of regulatory, planning and public awareness measures, establishment of priorities, and guide regulatory and enforcement interventions. Strategy 2 will address these information needs, thereby complementing DFO regulatory and compliance programs and improving our capacity to proactively monitor and protect habitat.



An overview of important habitat and habitat issues within CUs will be developed and habitat status will be assessed using indicators that combine scientific and local knowledge and recognize sensitive life stages and habitats. Indicators will be selected to be reflective of overall habitat health then tracked to assist in habitat planning within DFO and other jurisdictions, including First Nations

governments, the Province of BC and local governments. Habitat data gathered from many sources within and outside DFO will be linked and made more accessible for habitat planning. The assessment will highlight good quality habitat that needs to be maintained and protected, and degraded habitats that need to be restored or rehabilitated on the scale of watersheds and Conservation Units to inform strategic and annual planning for salmon conservation. Through integrated resource planning, DFO's Habitat Management Program will evolve to link habitat protection, resource assessment and stewardship with fish production.

These Action Steps represent a major change and will be implemented progressively to improve the effectiveness of DFO's program for protecting salmon habitat. The reshaping of the program will focus regulatory and enforcement responsiveness and effectiveness, strengthen linkages between habitat protection and fish production objectives, and provide guidance to watershed planning initiatives.

► Action Step 2.1.

Document habitat characteristics within CUs

Habitat requirements for Pacific salmon vary by species, life history characteristics and phase, and geography. CUs identified in Strategy 1 will include genetically similar lineages that are dependent on a set of habitats. The identification of the habitats that support or limit salmon production in watersheds and CUs will inform assessment, monitoring and protection priorities.

Information from multiple sources will be assembled by DFO at appropriate geographic scales to describe habitat conditions for individual CUs. Such sources include government agencies, First Nations, watershed-based fish sustainability plans, existing watershed processes, stewardship groups and oceans integrated management. An overview report will be prepared for each CU that will provide sufficient information on key habitats to identify initial priorities for protection, rehabilitation, and restoration. It will also identify information gaps and factors, such as water quality and quantity, that potentially threaten the future

health and productivity of habitats in the CU. This information will contribute to watershed planning with First Nations governments, industry, stewards and other jurisdictions and will serve as an effective initial guide for habitat protection and planning priorities in Strategies 4 and 5. This improved understanding of salmon habitats will also be valuable as an educational tool for stakeholders.

► **Action Step 2.2.**
Select indicators and develop benchmarks for habitat assessment

A variety of quantitative and qualitative indicators of habitat status exist. In fresh water, examples include water quality, temperature, stream flow, fish and invertebrate densities, and features such as quantities of good quality gravel. In estuarine and marine environments, Marine Environmental Quality standards may be used along with physical habitat indicators.

Indicators for CU's on a watershed scale will be selected to assess the quantity and quality of the habitats identified in Action Step 2.1. Indicators may be general across CU's or specifically selected on a case-by-case basis for specific CU's and habitat types. Government agencies, First Nations governments, watershed planning processes and stewardship groups will be asked to provide advice on the development or selection of key indicators for their watersheds, based on local knowledge and information on the kinds of data that are available.

Benchmarks will be developed to reflect the desired values of each key indicator. For example benchmarks for water temperatures could reflect optimal temperature range for salmon and will vary by species. Similarly, for an indicator such as gravel quality, the proportion of fine sediment as substrate in spawning areas could be utilized. Biological status indicators may also be used to validate habitat benchmarks. Benchmarks will be set that reflect our intent to take action to protect and restore habitat on a preventative basis as required, before population abundance declines in response to degraded habitat.

The product of this Action Step will be a set of indicators for CUs and benchmarks for the indicators.



► **Action Step 2.3.**
Monitor and assess habitat status

Based on the framework described in Action Steps 2.1 and 2.2, ongoing monitoring will be implemented to identify changes in habitat condition over time. This monitoring will be integrated with salmon assessments and ecosystem evaluations. The intent will be to better understand the relationship between changes in habitat condition and changes in salmon production and distribution within the CU. Monitoring will also be used to assess the effectiveness of regulatory decisions and rehabilitation measures. All monitoring results will inform both longer-term strategic planning and annual operations in habitat management. If a decline in habitat quality or quantity over time is detected, efforts will be made to identify the causes and response measures will be considered as part of an integrated management plan for the Conservation Unit.

The implementation of monitoring and assessment of habitat status will provide four key inputs to guide habitat management. These are:

- Important habitat in need of protection to maintain salmon productivity;
- Habitat risks and constraints that are adversely affecting that productivity;
- Areas where habitat restoration or rehabilitation would be desirable to restore or enhance productivity; and
- Investigations to fill information gaps.

These key inputs will also guide the integrated strategic plans (Strategy 4), where long term priorities for habitat protection and restoration will be established to complement fish production objectives and Strategy 5 where annual plans will be developed, including ongoing compliance and regulatory functions. These inputs will also be useful for other jurisdictions responsible for components of salmon habitat.

This information will allow DFO to recognize and protect the habitats required for the conservation of wild salmon using tools appropriate to the circumstances. Through risk assessment and planning, efforts will be focused where there are activities with a high likelihood of significant impacts and where there are sensitive and important habitats. Activities with a low likelihood of impact or those that impact other habitats will be dealt with through the use of guidelines and standards. All habitats will be addressed but protection and recovery efforts will vary depending on the habitat value.



► **Action Step 2.4.**
Establish linkages to develop an integrated data system for watershed management

Together with the Province of British Columbia and other partners, DFO will promote the design, implementation, and maintenance of a linked, collaborative system to increase access to information on fish habitat status. A more unified salmon

habitat data system can be achieved by improving common access to the extensive data holdings of DFO, Provincial and Territorial agencies, other levels of government, and stakeholders that describe watersheds and habitat conditions. Improved sharing of information will accelerate and strengthen assessment and reporting of habitat status for CUs. Over time, it will also allow cumulative changes in habitats and wild salmon status to be identified and appropriate actions taken.

STRATEGY 3 INCLUSION OF ECOSYSTEM VALUES AND MONITORING

Pacific salmon play important roles in marine (oceanic, coastal, and estuarine), freshwater (lake, stream, and wetland), and terrestrial ecosystems (adjacent to streams and rivers, the riparian zone). There is ample scientific evidence demonstrating that nutrients derived from salmon carcasses are important to freshwater and riparian ecosystems. However, few studies provide advice on the numbers of salmon necessary for healthy freshwater ecosystems, or link these ecosystems with the dramatic effect that changes in climate and marine conditions can have on the survival and production of Pacific salmon. For example, it is now known that the ocean's capacity for salmon production can be limited, is highly variable over time, and can have an enormous effect on the abundance and condition of adult salmon (e.g., body size, energy content). Survival rates from when salmon enter the sea until they return to coastal waters as adults have been measured to vary by more than a hundredfold (even a thousand fold in some cases).

A challenge for the Wild Salmon Policy is the need for development of an ecosystem objective that is widely appreciated but difficult to quantify. Coupled with this uncertainty is increasing concern for long-term climate change that will affect marine and freshwater ecosystems. Monitoring this variation and implementing appropriate management responses to address potential impacts will be increasingly important to future conservation efforts.

The Department's intent is to progressively consider ecosystem values in salmon management, but it acknowledges a limited ability to do so at the present time. The following steps will provide the scientific understanding and technical capacity to include ecosystem values over time.

► **Action Step 3.1.**
Identify indicators to monitor status of freshwater ecosystems

The Department will use existing data and expert advice to identify key indicators (biological, physical, and chemical) of the current and potential state of lake and stream ecosystems (diversity of organisms, rates of biological production, etc.). Within two years, an ecosystem monitoring and assessment approach will be developed and integrated with ongoing assessments and reporting on the status of wild salmon. Implementation of this approach will be coordinated with the monitoring of CU status (Action Step 1.3), their habitats (Action Step 2.3), and marine conditions (Action Step 3.2). In the process, knowledge gaps and areas requiring further research will also be identified.

► **Action Step 3.2.**
Integrate climate and ocean information into annual salmon management processes

To understand changes in climate and oceans and their consequences for salmon production, the freshwater monitoring programs identified in Step 3.1 will be integrated with programs investigating variability in climate and ocean conditions. Canada is developing programs to monitor and study these conditions. To relate variations in freshwater and marine ecosystems, networks of freshwater indicator systems (see Action Step 1.3) are being discussed internationally to assess the magnitude and spatial scale of changes in climate and ocean conditions. Linking variations in salmon returns to changes in the marine ecosystems requires large-scale monitoring programs, extensive planning, and collaboration with domestic and international organizations.

Information on climate and marine conditions will continue to be provided through DFO's State of the Ocean reports, and will be linked with assessments of the marine survival of Pacific salmon. Coupled with results from Action Step 3.1 and ongoing assessment of salmon survival, research in this area should lead to improved understanding of production dynamics and better management of Pacific salmon. This step is also linked to Canada's Oceans Strategy, which recognizes the need to better understand ecosystem dynamics, including climate variability and impact of change on living marine resources.

A more comprehensive view of salmon production and its determinants, from egg to spawning adult, is necessary to direct management actions more accurately and effectively conserve Pacific salmon resources in an uncertain future.

Climate Change and Wild Salmon

There is increasing evidence and support that the world's climate is changing and, in particular, that "global warming" is taking place.²

The climate-related effects anticipated for wild salmon are difficult to predict. Common expectations include increased summer water temperatures, changes in seasonal flows, more extreme flow events, and changes to ecosystems. When and where change occurs will also be highly variable. So how can the Wild Salmon Policy possibly protect Pacific salmon against these events? The WSP will have limited ability to directly protect salmon from climate change, but the policy's premise – to protect diversity and their habitats – is critical to allowing Pacific salmon to adapt to future changes. By maintaining the genetic diversity of wild salmon and the integrity of their habitat and ecosystems, the WSP will help ensure viable wild salmon populations in the future. At the same time, while salmon adjust to these pressures, managers could expect productivity and allowable catches to decline.

The importance of protecting diversity and maintaining healthy diverse populations of fish was also recognized as an important strategy in a recent federal government report on climate change impacts and adaptation.²²

²See the findings of the Intergovernmental Panel on Climate Change (www.ipcc.ch/) and British Columbia Ministry of Water, Land and Air Protection (2002), *Indicators of Climate Change in British Columbia*.

²²Natural Resources Canada (2004), *Climate Change Impacts and Adaptation: A Canadian Perspective*.

Recent Progress Towards Integrated Management – the Integrated Salmon Harvest Planning Committee

Some early progress towards integrated management has already been achieved with salmon harvest planning in BC. For example, the recently formed Integrated Salmon Harvest Planning Committee includes elected representatives from all commercial gear and area groups, and representatives nominated by First Nations and the sports fishing community, non-governmental environmental organizations, and the Province of British Columbia. As operation of this committee evolves, it will help to provide inclusive and balanced information for the development of commercial and recreational fishing plans that respect First Nations food, social and ceremonial fisheries and other obligations to First Nations. This is a useful starting point, but much more needs to be done to link the work of the committee with other more localized watershed-based planning processes and interests, as well as with broader marine area planning initiatives.

STRATEGY 4 INTEGRATED STRATEGIC PLANNING

The life cycle of Pacific salmon necessitates a planning process that addresses salmon conservation from the eggs in the gravel in parental generations to the eggs in the gravel produced by their offspring (see Figure 4). Planning for Pacific salmon presently falls short of this need. Many different planning activities currently take place, each with its own role but operating in relative independence from others. A demanding challenge in implementing the Wild Salmon Policy will be the establishment of an effective planning process that fully addresses the conservation of Pacific salmon, meets the federal government's obligations to First Nations, considers the needs of other Canadians, and involves those affected by decisions. Strategy 4 is intended to address this challenge.

The purpose of Strategy 4 is to develop long-term strategic plans for CUs and groups of CUs and their habitat subject to common risk factors. These plans will account for their biological status and provide recommendations on salmon conservation that reflect the interests of people at local and regional levels. Strategies 1, 2 and 3 will provide information on the status of the CUs, their habitat and the ecosystem as inputs to the planning process. However, strategic plans need to integrate this information and:

- Specify long-term biological targets for CUs and groups of CUs that ensure conservation and sustainable use;
- Identify recommended resource management actions to protect or restore Pacific salmon, their habitats, and ecosystems in order to achieve these targets; and
- Establish timeframes and priorities for actions.

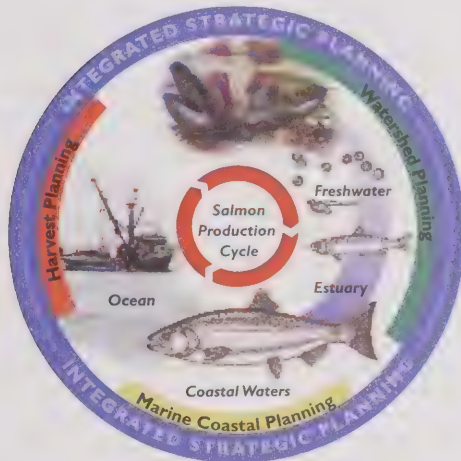
Consistent with the goal and objectives of the WSP, the plans must be designed to safeguard the genetic diversity of wild salmon, maintain the integrity of their habitat and ecosystem and result in fisheries that are managed for sustainable benefits. To do this, the plans will need to address the causes of any declines and identify the resource management actions necessary to remedy them where possible. The preferred long-term outcome of the plans will be healthy habitat and ecosystems and CUs above their higher benchmarks. But as a minimum, the plans must be capable of maintaining and restoring all CUs above their established lower benchmarks with an acceptable degree of certainty within a defined time frame. The development of these plans will require choices. The short and long term benefits as well as costs of decisions must be well documented and explicitly consider uncertainties in not only the scientific information, but also in the economic and social information that decision makers use.

Ultimately, these strategic plans will inform the development of annual fishery management, habitat, and enhancement plans and form the basis for ongoing dialogue with First Nations governments, Provincial, Territorial and local governments and other private parties whose support and cooperation is essential to sustain Pacific salmon in Canada.

Establishing an integrated process to achieve such plans will not be easy or immediate. Successful development and implementation will require extensive effort and cooperation between all levels of government and many different interests. Strategy 4 therefore includes two Action Steps to achieve the goal and objectives of the policy:

- The establishment of an interim process (Step 4.1) that provides for immediate progress; and
- The development of a new integrated planning structure that will better meet the needs of the resource over the longer term (Step 4.2).

Figure 4 WSP integrated strategic planning will cover all stages of Pacific salmon life history



► **Action Step 4.1:**
Implement an interim process for management of priority CUs

At present across BC and the Yukon, planning related to salmon occurs at various geographic scales and for a variety of purposes. Bi-lateral consultations take place with individual First Nations. Watershed-Based Fish Sustainability Planning (WFSP) initiatives are underway in local areas involving First Nations governments, the Province, local stewardship groups, and other community interests brought together to sustain fish habitat. More broadly, Integrated Fisheries Management Plans (IFMP) are developed for Northern British Columbia, Southern British Columbia, and the Yukon in consultation with individual harvesting groups and others interested in Pacific salmon. Marine use planning, a key component of Canada's Ocean Strategy and Action Plan, is proceeding on a pilot basis. At the broadest geographic scale, the Government of Canada with input from advisors engages in planning related to the Pacific Salmon Treaty and other international agreements such as the North Pacific Anadromous Fish Convention.

Linking CUs, Fisheries, and Watersheds for Planning Purposes

Salmon management is complex, involving five species divided into numerous Conservation Units in many watersheds that are exploited by various users in a myriad of fisheries. Considerations of biology and geography need to be brought together in an organized way with social and economic considerations for practical and efficient planning and fully informed decision-making.

In some cases a CU will encompass a relatively large geographic area that includes more than one population or watershed with a number of discrete fisheries targeted at sub-components of the CU. In these cases habitat, fisheries and marine area planning may need to proceed at a finer scale than the CU in its entirety (e.g., perhaps a watershed scale). In other cases there will be interdependencies and overlap between fisheries and among species within individual watersheds. In these cases planning for the conservation and sustainable use of an individual CU should not be done in isolation from other CUs within the watershed.

In these latter circumstances, CUs may need to be aggregated for planning purposes. For example, a wide range of user groups in numerous different fisheries harvest Skeena River sockeye salmon. Skeena River sockeye may include more than 20 CUs originating throughout the Skeena River drainage system. Habitat, fisheries, and marine area planning for any CU within the system must consider and account for potential impacts on all the others. As a result, the appropriate planning unit for Skeena sockeye will likely encompass all these associated sockeye CUs and the entire Skeena River watershed.

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**Linking CUs, Fisheries,
and Watersheds for
Planning Purposes**

Although the resulting plan will be developed for the aggregate in these cases, the ultimate effect will be individual plans for each CU within the aggregate. Planning choices made at the aggregate level with respect to habitat, enhancement, and fisheries management measures will effectively translate into impacts on and targets for each of the individual CUs within the aggregate. However, the plan for each individual CU will reflect full consideration of the impacts on all other CUs within the aggregate.

It is anticipated that between 50 and 60 planning units (defined by fisheries, geographic location and watershed) will be needed to cover all CUs of Pacific salmon. Some planning units will encompass components of CUs and some will encompass groups of CUs subject to one or more common risk factors. The number and scale of these planning units will facilitate practical and efficient planning for wild salmon.

Ultimately, these diverse planning processes and the various interests involved need to be linked to provide inclusive and comprehensive input to integrated plans that encompass salmon, fisheries, watersheds, and marine areas throughout British Columbia and Yukon. In addition, broader and more direct linkages with First Nations governments, Provincial, Territorial and local governments need to be forged so that other land and water use activities and decisions better support the needs of salmon.

Until a fully integrated planning process can be established an interim approach is needed that will immediately improve integration between habitat, enhancement, fisheries, and marine area planning, and provide more inclusive input to resource management. This interim approach will meet the Department's obligations to consult First Nations and respect the process for salmon planning defined in the Nisga'a Final Agreement. In addition, advice from harvesters, stewardship groups and others will be gathered using existing processes.

Interim procedures will build on and expand the approach now used to develop IFMP's for salmon. The biological status of a CU or group of CUs vulnerable to fisheries in an area will be reviewed.²¹ CUs in the Red zone and those that could significantly limit fishing and other activities will be identified as management priorities. The protection and restoration of these CUs will be primary drivers for harvest, habitat and enhancement planning. For these priority CUs, DFO will consult with First Nations and then bring together the various interests from existing processes to provide recommendations for protection and restoration. In collaboration with the Department, these "response teams" will collate and consider information from all sources and make recommendations using a five-step planning procedure outlined in Appendix 2. It is proposed that response teams would include representatives of First Nations and other local and regional interests. Their recommendations will inform regional planning and program delivery and will be subject to consultation with First Nations as required. In addition, during this interim period the Department will pay careful attention to identifying and responding to any other vulnerable CUs so they do not decline in status.

Resource management recommendations from response teams will be guided by precautionary approaches and will be consistent with the first principle of this policy. Specifically, recommendations will be expected to provide an acceptable degree of confidence that these priority CUs will rebuild beyond the lower benchmark within a defined time frame. The progress made towards achieving biological targets for priority CUs will be reviewed annually (as described in Strategy 6) and adjustments to plans made as appropriate. This interim process will be used until overall responsibilities for the development of long term strategic plans for all CUs can be assumed by a new planning structure (Action Step 4.2).

²¹The concept of planning units for Pacific salmon is described in the side bar "Linking CUs, Fisheries and Watersheds for Planning Purposes" and is an organizational construct that will be used to associate a group of CUs (CUs that are subject to common risk factors) with regional fisheries.

► **Action Step 4.2:**
Design and implement a fully integrated strategic planning process for salmon conservation.

The Department will consult with First Nations, Provincial and Territorial governments, communities, and stakeholders to design an effective integrated planning process that respects people's interests in Pacific salmon, land and water uses, watersheds, fisheries, and marine areas. This policy does not dictate that process. Those affected need to be directly involved in the process design and implementation. It is however appropriate to describe what is envisioned. The planning process will ultimately consist of a new planning structure that will develop the plans through an organized procedure.

A New Planning Structure

The new planning structure will be tasked with developing long-term strategic plans for CUs that will guide fisheries and other activities in specific geographic areas affecting the CUs. These plans will need to determine long term biological targets for CUs and for habitat and ecosystem status and address significant conservation concerns by ensuring that all CUs will remain above their established lower benchmarks with an acceptable degree of certainty. The development of these plans will need to consider risks to wild salmon, as summarized in the status assessment of the CU, and weigh the biological, social and economic impacts of fishing and other activities (Principle 3).

Governments must operate in a manner consistent with the terms of treaties negotiated with First Nations such as the Nisga'a Final Agreement. Governments also have a legal obligation to consult with First Nations and depending on the strength of the claim of Aboriginal rights or Aboriginal title and the seriousness of the potential adverse effect of a decision on the claimed rights or title, accommodate their interests where Governments have knowledge of the potential existence of Aboriginal rights or Aboriginal title and are making decisions that might adversely affect these rights or title. Bilateral consultations between Governments and First Nations will be a foundation for the new integrated planning structure. In addition, measures taken by Federal, Provincial and Territorial governments to protect First Nation salmon fisheries will be a starting point for the development of long term strategic plans for wild salmon.

The results of these First Nations consultations will then need to be complemented by broader local and eventually region-wide input. It is suggested that local planning committees for sub-regions need to be established that can bring together all local First Nations governments, harvesters, community interests, local and regional government and other stakeholders to link with more localized projects important to local areas (like Watershed-based Fish Sustainability Planning processes) and assemble, assess and analyze information and seek local consensus. In addition, the various interests involved in local planning will need to be

Modern Treaties and the Planning Process

The Nisga'a Final Agreement is the first "modern" treaty entered into in British Columbia and applies to the management of salmon originating in the Nass Area, as defined in the Final Agreement. The Final Agreement provides that the Nisga'a Nation has the right to harvest chinook, chum, coho, sockeye and pink salmon originating in the Nass Area.

Under the Nisga'a Final Agreement, representatives of the federal government and the Nisga'a Lisims Government participate on a Joint Fisheries Management Committee (JFMC) to facilitate cooperative planning and conduct of Nisga'a fisheries and enhancement initiatives in the Nass Area. Various responsibilities are assigned to the JFMC, including providing advice concerning escapement goals and making recommendations to the Minister and Nisga'a Lisims Government in respect of other conservation requirements and the management of fish and aquatic plants.

Planning and implementation of the Wild Salmon Policy, as it applies to salmon originating in the Nass Area, will be in accordance with the Nisga'a Final Agreement. The JFMC will play a key role in this work. Similarly, the Department will act in accordance with the provisions of the Yukon Final Agreements when dealing with salmon conservation pertaining to the treaty settlement areas.

Key Attributes of an Effective Planning Process

An effective planning structure will require that the various interests involved build the mutual trust necessary to work together toward their goals. Key attributes of the new structure should be:

Inclusiveness

All parties that are affected by a planning outcome should have the opportunity to provide input to the articulation of objectives, the identification of management options, and the evaluation and selection of management alternatives. All parties should respect the others' opinions and processes, and work towards consensus.

Transparency

Responsibility for final decision-making and linkages between the various parts of the planning structure should be clearly described and agreed upon. Information considered in making recommendations should be publicly available and communicated in a timely manner. Recommendations and decisions should be carefully described and the reasons for them clearly explained.

Effectiveness

Individual planning bodies within the planning structure should be small enough to provide for focused discussion and dialogue but large enough to represent the full range of interests in the matters under discussion.

Respect for Consultation Processes with First Nations

Governments have a legal obligation to consult with First Nations. Any new planning process will not compromise or undermine existing consultation processes with First Nations. Planning processes will be in accordance with any applicable provisions of the Nisga'a Final Agreement, the Yukon Final Agreements, and any other treaties entered into between the federal government and First Nations.

Respect for Other Existing Processes

The results of other planning processes must also be respected, particularly those that deal with legal requirements under SARA and other federal legislation and obligations under international treaties.

Accountability

Participants in the planning process must be accountable to the people they represent by defending the advice they have provided and to the process by defending the manner in which decisions were made.

brought together region-wide to confirm overall support and resolve any inconsistencies between local plans. The number and the geographic scale of local area planning committees and the relationship between First Nation consultation processes, local, and region-wide committees in this planning structure are key matters to be resolved through consultation.

There will be two keys to success for a new planning structure. First, given the central importance of First Nations salmon fisheries, there will ideally need to be a high degree of support and participation by First Nations at all levels of the planning structure. The role and the terms of reference for new multi-party committees within the structure will need to be carefully crafted in consultation with First Nations and other interests to meet this need. The Department recognizes that the provisions for participation of First Nations will need to respect their individual governance structures. Second, there will need to be a high degree of support and involvement of Provincial, Territorial and local government at both local and region-wide levels of the structure. Bringing the constitutional and administrative mandates of these other levels of government to manage land, water and waste to the table will dramatically enhance and improve the chances for success of strategic planning efforts. This will require strong efforts by the Department and others to build the necessary political will and commitment for these other levels of government to support and participate in the planning process.

A Planning Procedure

The development of strategic plans for CUs should follow a formal and open procedure that will result in informed decision-making.

This policy presents a five-step procedure for development of the strategic plans that breaks down decision-making into a logical and manageable sequence. This procedure is detailed in Appendix 2. It seeks to engage the various interests in Pacific salmon throughout the development of the plans – from the establishment of planning priorities through to the evaluation and selection of the



preferred management alternative. This will explicitly encourage the pursuit of creative solutions and help to focus planning discussions on the relevant issues and considerations throughout the development of plans. This is intended to build consensus on the most appropriate management approach and facilitate public understanding of final management decisions.

The Minister of Fisheries and Oceans is accountable to Parliament for the conservation of fisheries resources. Accordingly, strategic plans for salmon conservation and sustainable use will be subject to final approval by the Minister of Fisheries and Oceans. The Minister may reject plans or elements of plans because they do not adequately conserve wild salmon. Alternatively, in exceptional circumstances, where recommended management actions are assessed to be ineffective, or the social and economic costs will be extreme, the Minister of Fisheries and Oceans may decide to limit the extent of active measures undertaken. The new planning process described above is expected to minimize the need for such decisions, but this possibility should be recognized. The rationale for such decisions will be clearly explained. In addition, any cumulative effect of these decisions will be closely monitored.

Enhancement and Wild Salmon

Enhancement of Pacific salmon has been largely delivered through the Salmonid Enhancement Program (SEP). SEP was launched in 1977 to augment production for harvest through a combination of natural and artificial enhancement techniques. The program was also designed to involve the public, raise awareness of the salmon resource, and generate jobs and economic development in coastal and First Nations communities. Its focus has since broadened to encompass rebuilding depleted stocks for conservation purposes with a greater emphasis on the integration of harvest and habitat management with stock rebuilding. The program uses a rebuilding strategy whereby a portion of the enhanced fish spawn naturally in the waters from which they originated in order to rebuild or maintain the population. This means that in river systems where there is a hatchery or spawning channel, fish spawning naturally in the river may consist of both wild and enhanced salmon. The probability of genetic changes to wild salmon is controlled by the use of native populations for broodstock and broodstock collection and spawning guidelines.

Enhancement activities have contributed a significant proportion of the salmon produced in British Columbia and the Yukon. The proportion varies by species, geographic area, and year, but since the 1980s, 10 to 20 per cent of the BC commercial catch has originated from SEP. Moreover, some recreational fisheries are dependent on enhanced salmon, such as mark-selective fisheries on coho salmon, and various freshwater fisheries. As part of integrated strategic plans, enhancement will continue to be used as a means of addressing social and biological objectives through the rebuilding of populations with an unacceptable chance of extirpation by providing harvest opportunities and fishery benefits.

SEP has developed many useful tools for producing and restoring Pacific salmon, and it enjoys substantial public support. Evaluations undertaken for enhancement also provide important data used for the assessment and management of wild salmon. However, enhancement, particularly hatcheries, poses some acknowledged risks to wild salmon. Wild populations harvested with more productive enhanced populations may be overexploited. Hatchery practices may alter genetic diversity. Wild salmon may have to compete with enhanced salmon for food and space in the marine and freshwater environments. SEP employs practices to minimize these risks including:

- guidelines to manage spawning and hatchery practices to maintain genetic diversity and minimize impacts on resident freshwater juveniles
- review and licencing of all fish movements under Section 55/56 of the Fishery (General) Regulations
- annual planning processes that link
 - hatchery production with planning of major fisheries targeting enhanced populations
 - hatchery assessment with stock assessment planning frameworks to ensure that enhanced indicator populations can be effectively used for both the assessment of enhancement programs and for wild salmon assessment and management

Aquaculture

Over the past decade, production from salmon aquaculture has expanded threefold, and the value of farmed salmon now exceeds that from commercial salmon fisheries. The industry's development has provided employment and income in coastal communities, where economic opportunities are often limited. This expansion has not been without controversy.

Jurisdiction for the regulation of aquaculture is shared between the Federal and Provincial governments. The provision of aquatic land tenures and the licencing of aquaculture operations in BC is the responsibility of the Provincial government. The Department's role, as the lead federal agency for aquaculture, is to manage aquaculture so that it is environmentally sustainable, socially responsible, and economically viable. In 2002 the Department released the Aquaculture Policy Framework (APF)²² to guide the Department's actions with respect to aquaculture. The first principle of the APF directs the Department to support aquaculture development in a manner consistent with its commitments to ecosystem-based and integrated management, as set out in Departmental legislation, regulations and policies. This principle reflects the Department's mandate for the conservation of marine resources.

It is recognized that aquaculture operations, as with other human activities, pose risks to the natural environment. These potential impacts to wild salmon include: the chance of disease and parasite transfer, competition and genetic effects of escapes, and physical disturbances in near-shore environments. Risks are addressed through mitigation measures such as Fish Health Management Plans, improved cage structures and proper farm siting.

All fish farm sites must undergo a review for potential habitat effects under Section 35 of the *Fisheries Act*. The review includes evaluation of information on the size of the farm combined with specific features of the site such as benthic habitat and water currents and is intended to minimize the effects on important habitat such as eelgrass beds. Subsequent monitoring is carried out in conjunction with Provincial agencies.

The vast majority of marine fish farm sites also require, through either a *Fisheries Act* authorization or *Navigable Waters Act* permit, a screening for a broad range of environmental effects under the *Canadian Environmental Assessment Act* (CEAA). The CEAA screening examines the potential environmental effects of the project, judges the effectiveness of mitigation measures and assesses any residual impacts on the environment. A screening for a fish farm site encompasses all the potential effects on the natural environment, including the impacts of disease and parasite transfers, escapes, waste discharges and impacts to wildlife. Impacts which are judged to be significant must be addressed through mitigation measures, set out in required management plans and through adherence to Provincial regulations for fish health, escape prevention, sea lice monitoring and waste discharge. The CEAA screening also considers the cumulative effects of other projects in the same area and only those projects that are unlikely to cause significant adverse environmental effects (post mitigation) are allowed to proceed.

The goal, principles, and objectives of the Wild Salmon Policy will guide the regulatory actions of the Department. Aquaculture operations will be regulated in a manner consistent with other human activities that may adversely affect salmon or their habitat and DFO will continue to invest in research to improve our understanding and management of this industry.

²²DFO (2002a), *Aquaculture Policy Framework*.

**WSP Implications:
Science, Including
Stock Assessment**

- Scientific programs will be refocused to complement changes to fisheries management, the immediate need being identification and documentation of Conservation Units and benchmarks for each Pacific salmon species.
- Stock assessment programs will build on existing monitoring programs to assess wild salmon at appropriate geographic scales.
- Refocused programs will emphasize assessing the status of CUs, understanding changes to productivity and distribution, and developing risk assessment and management tools to guide decision-making.
- DFO scientists will work with habitat and fishery managers to develop approaches to integrate ecosystem considerations into assessment and management.
- Co-management will be promoted with First Nations, and more partnerships will be necessary with public and private groups to collect required data, given the expanded monitoring needs and constraints on available funding.

**STRATEGY 5
ANNUAL PROGRAM DELIVERY**

A strategic plan gives a longer-term context for annual operational and business planning cycles. The strategic plan described in Strategy 4 will establish overall objectives and the various approaches that will be followed to achieve them. It will be left to annual operating plans to detail the specific short-term actions that actually implement the long-term strategy. Annual plans will identify the particular activities to be undertaken, the short-term operational targets for these activities, and the linkages to longer-term goals and objectives.

► Action Step 5.1.**Assess the status of Conservation Units and populations**

Under this policy, DFO will assume a leadership role in partnerships to develop monitoring programs and assessments of wild salmon. Assessment will include field activities, which will build on existing programs as much as possible, and detailed stock assessments, which will identify the reasons for changes in status. Annual priorities for detailed assessments will be determined through PSARC, and documents prepared by Departmental staff and technical experts in other organizations involved with a CU, particularly the First Nations. The assessment of CUs will be staged over time, cost-effectively using a range of approaches. CU status will influence the frequency and detailed assessments but monitoring of abundance and distribution of salmon in CUs must be an annual commitment to protect the information basis for all decisions.

Stock assessment work plans describing the assessment plan for each CU and related activities (e.g., research or habitat activities) will be updated annually for each region (e.g., North Coast, Yukon). They will be reported as part of a database that describes for each region major risk factors and changes to these factors, assessment strategies within the region, resource management objectives, enhancement activities, and benchmarks. DFO will also commit to providing an open database of information on catch and spawning escapement, with links to the habitat integrated data system, so that threats or impacts can be identified and monitored.

► Action Step 5.2.**Plan and conduct annual fisheries**

The specific annual fisheries management measures required by the management strategies selected under Strategy 4 will be identified and documented in annual Integrated Fishery Management Plans. These plans will include arrangements for food, social and ceremonial and treaty fisheries by First Nations and selective harvesting and other regulatory measures that will be put in place, such as bag and possession limits and anticipated open and close times.

Another key element of annual fisheries planning will be the development of explicit agreed-upon rules for in-season decision-making. The uncertainties and variations in fish availability associated with natural

survival and the imprecision of in-season management cannot be eliminated, but they can be better accounted for. Management plans will incorporate estimates of uncertainty and provide an adequate degree of confidence that management objectives will be met. The management responses to be taken in different circumstances will be more transparently identified and documented in advance of the fishing season. Important input on these decision rules will be sought from First Nations and the Integrated Salmon Harvest Planning Committee.

► Action Step 5.3.

Plan and implement annual habitat management activities
Habitat program work will shift from being largely reactive, to being planned and strategically directed in order to protect habitat and to implement management measures that meet the long term objectives specified by Strategic Plans (Strategy 4).

Strategy two will identify habitats that underpin achievement of overall objectives for Conservation Units. These will include habitats that are intact and require protection or habitats that are degraded and require restoration or rehabilitation. Annual workplans will specify priorities for habitat rehabilitation or restoration work that will be undertaken by DFO or by DFO in partnership with others, and investigative work that may be undertaken to fill knowledge gaps. Plans will also recognize the need for protection of the key habitats identified in Strategy 2 using tools appropriate to the circumstances. Planning for restoration and habitat improvement will incorporate projects conducted by First Nations, volunteers and stakeholders and make use of more accessible data from a variety of sources.

On an annual basis, a report on regulatory functions related to key habitats and restoration and rehabilitation works will be prepared. Habitat assessment and monitoring will feed back into the Habitat Management Program to evaluate measures for habitat protection and compliance, and to guide future program improvements. This new strategic approach to program delivery should ensure that fish habitat protection objectives are better integrated with fish management objectives at the CU level, leading to improved habitat protection.

► Action Step 5.4.

Plan and implement annual enhancement activities

The long-term objectives for enhancement projects will be set as part of a planning or recovery process for a Conservation Unit. Enhancement programs will last more than a year, but annual production targets and strategies will be documented in IFMP's and will be consistent with objectives for CUs. Adult salmon production will be assessed for adherence to the rebuilding schedule and enhancement guidelines and practices. Priority projects will target CUs in the Red or Amber zone, where enhancement has been identified as a contributor to rebuilding. Secondary priority will be given to CUs where enhancement has been identified in planning processes as a means to maintain or develop fisheries.

WSP Implications: Harvest Management

- Harvest management will focus on the conservation of CUs.
- The practical implications of this change for harvest management will depend greatly on the extent to which the CUs identified under this policy differ from the salmon runs currently targeted by the different fisheries. This, in turn, will vary among salmon species.
- There will likely be relatively few impacts on the management of chum and pink salmon, as these fisheries currently target smaller population components than may be identified as CUs.
- More substantial impacts can be expected for the management of coho and chinook salmon, as the number of CUs will likely increase marginally from present management aggregates.
- Impacts on sockeye management will be significant, since these fisheries target runs that often encompass numerous CUs.
- The WSP will not preclude fisheries operating on population aggregates that include numerous CUs, but increased attention to all of the units within the aggregate will likely require significant changes to current management practices.

**WSP Implications:
Habitat Management**

- The Habitat Management Program will change to better link watershed protection and stewardship initiatives with fish production objectives by integrating habitat monitoring, assessment, and program planning at the CU scale.
- Habitat condition will be assessed through the development of indicators and benchmarks, and monitoring will be conducted to identify changes in habitat status over time and assess the effectiveness of regulatory interventions.
- An integrated data system for the collection and dissemination of information on fish habitat status will be supported through improved access between existing systems.
- These new approaches will complement existing efforts to modernize the national Habitat Management Program, aimed at moving from a focus on single regulatory strategy to a more balanced approach with greater emphasis on program planning, stewardship, and monitoring the success of habitat management in sustaining fish production.
- If specific Conservation Units of wild salmon are threatened by development proposals or other human activities, corrective actions will be taken under Section 35 (fish habitat) of the *Fisheries Act*, or longer-term solutions will be pursued as part of integrated planning processes.

**STRATEGY 6
PERFORMANCE REVIEW**

A performance review determines what is and is not working to encourage continuous improvement over time. Performance review under the Wild Salmon Policy will borrow heavily from procedures that are being adopted more generally in fisheries management planning throughout Canada. These procedures involve two levels of evaluation that can provide comprehensive guidance on changes required over time. Action Step 6.1 provides annual feedback on the implementation of measures taken as part of annual plans specified for fisheries, habitat, enhancement and assessment. Further, it evaluates whether adequate progress is being made to achieve the objectives defined in the strategic plan for the CU. Action Step 6.2 provides for periodic reviews of the overall success of the WSP in meeting its goal and objectives.

► Action Step 6.1**Conduct post-season review of annual workplans**

The Department in consultation with First Nations and others will conduct annual post-season reviews of work plan implementation for stock assessment, fishing, habitat, and enhancement that will provide the following:

- Evaluation of annual plan implementation. For example, if an annual fishing plan calls for a substantial reduction in fishing time, or an annual enhancement work plan calls for certain fry release levels in a given year, it is important to know whether these events took place.
- Evaluation of annual operational targets. For example, the operational targets may be exploitation rates in certain fisheries and lineal metres of habitat rehabilitation, both intended to increase the number of spawners. An evaluation will consider whether annual operational targets were achieved and whether they were effective in meeting the intent of the Strategic Plan.
- Recommendations for adjustments for the next season.

► Action Step 6.2.**Conduct regular reviews of the success of the WSP**

An independent review of the success of the WSP in achieving its broad goals and objectives will be conducted within 5 years of its adoption. On the basis of the review, the implementation of the policy will be revised to address shortcomings that may be reducing its effectiveness.



IMPLEMENTATION “Making it all Work”

The adoption of a wild salmon policy is an important, long-awaited objective, but not an end in itself. Once it is adopted, attention must shift to implementation. The WSP requires acceptance of new ways of doing business and introduces a number of new program obligations. To ensure its commitments are met, an implementation plan will be prepared after the policy's finalization. This plan will stipulate what tasks are required, how they will be performed, and when they will be completed. On completion, the plan will constitute the Department's commitment to meeting its responsibilities for salmon conservation.

The six strategies proposed in the WSP represent a set of mutually dependent activities that must work together for the policy's goal and objectives to be achieved. Since the individual strategies are not autonomous, successful implementation of each one of them is necessary to ensure the overall success of salmon resource management.

This new approach to salmon conservation is complex, and the pace and effectiveness of implementation will be influenced by two key factors. First, implementation must be accomplished within DFO's existing resource capability and will be phased in over time. Second, it will depend on the effectiveness of our sharing of responsibilities with First Nations Governments, volunteers, stakeholders and other Governments.

Full implementation will not be achieved overnight. Establishing the management and consultation process, and allowing it to mature, will take time. The completion of scientific work to define Conservation Units,

WSP Implications: Species at Risk

- The WSP will facilitate taking management actions in advance of biological listing under COSEWIC and legal listing under the *Species at Risk Act*.
- This will directly contribute to meeting DFO's legal obligations under SARA, by helping to prevent aquatic species from being extirpated or becoming extinct.
- Proactive responses in advance of listing will help to manage and reduce any adverse social and economic impacts that might arise from conservation actions required under a SARA listing.

**WSP Implications:
Aquaculture**

- Aquaculture operations will be regulated in a manner consistent with other human activities that may adversely affect salmon or their habitat.
- If specific Conservation Units of wild salmon are threatened by aquaculture operations, corrective actions will be taken under the *Fisheries Act*, or longer-term solutions will be pursued as part of an integrated planning process.

**WSP Implications:
Salmonid Enhancement
Program**

- The enhancement program will continue to evolve towards greater emphasis on community stewardship, habitat restoration, and rebuilding of priority CUs.
- Enhancement may be used to provide harvest opportunities and fishery benefits as part of an integrated strategic plan.
- The risks of hatchery production to wild salmon will be assessed through the development of a biological risk assessment framework.

establish benchmarks, and design new assessment systems will depend on the availability of data and scientific capacity. In addition, the policy introduces new challenges for the conduct of ongoing programs, and ultimate success depends on effective delivery of the Department's research, enforcement, and Aboriginal programs. All of these activities, ongoing and new, must be accomplished within the envelope of available funding. Accordingly, it must be emphasized that complete implementation will not be achieved instantaneously, but will be phased in gradually.

There is a second requirement for successful policy implementation. The Department must adopt better partnerships with First Nations Governments, volunteers, stakeholders and other levels of Government and share responsibility and accountability for program delivery. It is clear that DFO cannot and should not attempt to do it all. No matter how strong our commitment to implementing the WSP, success will demand better collaboration with all of the groups and individuals having an interest in wild Pacific salmon. All have important roles to play in achieving sustainable management of wild salmon and their habitat. These groups monitor and report catches, protect and restore habitat, and carry out biological assessment work. Too often, this work is not integrated effectively with Departmental activities, which can diminish its value or simply result in wasted effort and funds. More collaboration is required to develop data standards, agree on methodologies, and share responsibility if we are to get the full benefit from the financial and human resources that are collectively dedicated to salmon stewardship. Improved cooperation with partners will be an important ingredient for future success. The more transparent process for decision-making underlying this policy will ensure that we are better equipped to achieve this important outcome.



CONCLUSION

The Wild Salmon Policy will transform our approach to managing Pacific salmon, their habitat, and dependent ecosystems. It is intended to foster a more robust resource that supports sustainable fisheries and recognizes the intrinsic value of salmon to society and to ecosystem functioning. Key elements of the policy recognize that:

1. Protection of the genetic and geographic diversity of salmon is a prerequisite to their future evolutionary adaptation and long-term well-being.
2. Habitat requires effective protection and rehabilitation if salmon are to prosper.
3. Ecosystem integrity needs to be considered in management decision-making to foster the conservation of salmon in an increasingly uncertain future.
4. Management must be based on good scientific information and consider biological, social, and economic consequences.
5. Decisions have to be made using open and accountable public processes so that they reflect society's values.

The goal, objectives, principles, and strategies that underpin the WSP represent a new way of doing business. Moving ahead will require a redirection of the Department's energy and resources, along with a commitment to embrace and advance new practices. Success will also require the cooperation of all who have an interest in the conservation of Pacific salmon. We are confident that making these changes is a wise investment that will yield a brighter future for salmon and the Canadians who enjoy them.

GLOSSARY

Aboriginal Traditional Knowledge (ATK). Includes, but is not limited to, the knowledge Aboriginal peoples have accumulated about wildlife species and their environment. Much of this knowledge has accumulated over many generations.

Aquaculture. The farming of aquatic organisms in the marine environment or freshwater.

Biodiversity or biological diversity. The full range of variety and variability within and among living organisms and the ecological complexes in which they occur; and encompasses diversity at the ecosystem, community, species, and genetic levels and the interaction of these components.

Broodstock. Mature salmon from which milt and roe are extracted to produce the next generation of cultivated fish.

Conservation. The protection, maintenance, and rehabilitation of genetic diversity, species, and ecosystems to sustain biodiversity and the continuance of evolutionary and natural production processes.²³

Conservation Unit (CU). A group of wild salmon sufficiently isolated from other groups that, if extirpated, is very unlikely to recolonize naturally within an acceptable timeframe.

Deme. A group of salmon at a persistent spawning site or within a stream comprised of individuals that are likely to breed with each other (i.e., well mixed). A single population may include more than one deme.

Ecosystem. A community of organisms and their physical environment interacting as an ecological unit.

Enhancement. The application of biological and technical knowledge and capabilities to increase the productivity of fish stocks. It may be achieved by altering habitat attributes (e.g., habitat restoration) or by using fish culture techniques (e.g., hatcheries, spawning channels). In the context of this policy, only salmon originating from hatcheries and managed spawning channels will be considered enhanced.

Escapement. The number of mature salmon that pass through (or escape) fisheries and return to fresh water to spawn.

Extirpation. The local extinction of a species.

Fish habitat. Spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly to carry out their life processes.

Fry. Salmon that have emerged from gravel, completed yolk absorption, remained in freshwater streams, and are less than a few months old.

Genetic diversity. The variation at the level of individual genes, and provides a mechanism for populations to adapt to their ever-changing environment. It refers to the differences in genetic make-up between distinct species and to genetic variations within a single species.

²³For further details see Shuter et al. (1997), "Reply: Toward a definition of conservation principles for fisheries management;" Grumbine (1994), "What is ecosystem management?;" Mangel et al. (1996), "Conservation of wild living resources;" and Olver et al. (1995), "Toward a definition of conservation principles for fisheries management."

Geographic diversity. Spatial variability observed within a species. This variation may have a genetic basis and/or may reflect habitat and developmental differences expressed by the species.

Habitat restoration. The treatment or cleanup of fish habitat that has been altered, disrupted, or degraded for the purpose of increasing its capability to sustain fish production.

Indicator system (IS). Comprised of fish from one or more persistent spawning locations or populations (perhaps enhanced) that are assumed to be representative of some aspect of a Conservation Unit. An IS may be an index site or stream selected to detect annual changes in abundance and/or survival, or an extensive site or stream selected to monitor species distribution and general habitat status. The status of the surrounding CU is inferred, in part, by comparing measures of abundance gathered by monitoring the IS to benchmarks.

Integrated resource management (IRM). Can be defined as a way of using and managing the environment and natural resources to achieve sustainable development. Using an IRM approach means that environmental, social, and economic issues are considered, while finding ways for all uses to exist together with less conflict.

Managed spawning channels. Spawning channels where the entry of spawners and spawning density is controlled.

Maximum sustainable yield (MSY). The largest catch (yield) that can be taken on average from a population under existing environmental conditions. Catch will vary annually due to variation in a population's survival rate.

Pacific salmon. Salmon of the Pacific Ocean regions, of which there are currently eleven species recognized in the Genus *Oncorhynchus*. The five species addressed in this policy are sockeye (*Oncorhynchus nerka*), pink (*O. gorbuscha*), chum (*O. keta*), coho (*O. kisutch*) and chinook (*O. tshawytscha*). Also in BC are steelhead (*O. mykiss*) and cutthroat trout (*O. clarki*). The remaining species include the masu (Asian distribution, *O. masou*), Mexican golden trout (*O. chrysogaster*), apache trout (*O. apache*), and gila trout (*O. gilae*). These latter three species have limited distributions in the western U.S. and northern Mexico.

Population. A group of interbreeding organisms that is relatively isolated (i.e. demographically uncoupled) from other such groups and is likely adapted to the local habitat.

Precautionary approach. When used in an advisory context in support of decision-making by the Government of Canada, this term conveys the sense that the advice is provided in situations of high scientific uncertainty. It is intended to promote actions that would result in a low probability of harm that is serious or difficult to reverse.

Productive capacity. The maximum natural capability of habitats to produce healthy fish, safe for human consumption, or to support or produce aquatic organisms on which fish depend.

Resource management. Departmental actions, policies and programs affecting wild Pacific salmon directly or indirectly through their habitats and ecosystems.

Riparian zone and functions. The area of vegetation near streams is known as the riparian zone. Riparian function includes the interaction of hydrologic, geomorphic, and biotic processes within the riparian environment that determine the character of the riparian zone and the influences exerted on the adjacent aquatic and terrestrial environments (e.g., temperature controls, shading, large woody debris).

Salmonid. A group of fish that includes salmon, trout, and char, belonging to the taxonomic Family Salmonidae.

Selective harvesting. A conservation-based management approach that allows for the harvest of surplus target species or Conservation Units while aiming to minimize or avoid the harvest of species or stocks of conservation concern, or to release bycatch unharmed.

Smolt. A juvenile salmon that has completed rearing in freshwater and migrates into the marine environment. A smolt becomes physiologically capable of balancing salt and water in the estuary and ocean waters. Smolts vary in size and age depending on the species of salmon.

Species. The fundamental category of taxonomic classification consisting of organisms grouped by virtue of their common attributes and capable of interbreeding. A taxonomic species is equivalent to the term “species” but the phrase may be used to indicate the collective species throughout its distribution.

Stewardship. Acting responsibly to conserve fish and their habitat for present and future generations.

Stock assessment. The use of various statistical and mathematical calculations to make quantitative predictions about the reactions of fish populations to alternative management choices.

Straying. The migration of a mature salmon into a stream other than that in which it was born (i.e., its “home” stream). Straying is not equivalent to gene flow (the exchange of genetic material) unless the straying fish successfully reproduces in the receiving stream.

Sustainable Development. Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.²⁴

Sustainable Use and Benefit. The use of resources in a way and at a rate that does not lead to their long-term decline, thereby maintaining the potential for future generations to meet their needs and aspirations. Sustainable use refers to consumptive uses of biological resources.²⁵ Sustainable benefits, on the other hand, derive from a broader range of consumptive and non-consumptive resource uses.

Watershed-based Fish Sustainability Planning (WFSP). A new approach to the management of fish stocks and fish habitat in British Columbia. Its overall goal is to ensure effective long-term conservation of fish and fish habitat – including spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly. WFSP is based on a standard planning sequence that can be applied to regions and watersheds across the province.²⁶

Wild salmon. Salmon are considered “wild” if they have spent their entire life cycle in the wild and originate from parents that were also produced by natural spawning and continuously lived in the wild.

²⁴ Brundtland (1987), *Our Common Future: The World Commission on Environment and Development*.

²⁵ Environment Canada (1995), *Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity*.

²⁶ See www-heb.pac.dfo-mpo.gc.ca/publications/pdf/sustainability_planning_e.pdf.

APPENDIX 1: LEGAL AND POLICY BACKGROUND

DFO exercises the following mandate with respect to fisheries and other responsibilities:

*"Fisheries and Oceans Canada is responsible for policies and programs in support of Canada's economic, ecological and scientific interests in oceans and inland waters; for the conservation and sustainable utilization of Canada's fisheries resources in marine and inland waters; for leading and facilitating federal policies and program on oceans; and for safe effective and environmentally sound marine services responsive to the needs of Canadians in a global economy."*²⁷

This appendix outlines some of the key legislation, national and international agreements, and programs and policies with particular implications for the conservation and management of Pacific salmon.

► Legislation

The **Fisheries Act** is the primary legislative basis for fisheries management in Canada. It authorizes the Minister of Fisheries and Oceans to make decisions about the conservation of fisheries resources and habitat, to establish and enforce standards for conservation, and to determine access to and allocation of the resource. Sections 35 (prohibiting the harmful alteration, disruption, and destruction, or HADD, of fish habitat) and 36 (prohibiting the deposit of deleterious substances into waters frequented by fish) confer strong powers to protect fish habitat. The **Fisheries Development Act** of 1985 further authorizes the Minister to undertake projects and develop partnerships to improve or develop commercial fisheries.

The **Canadian Environmental Assessment Act** (CEAA) came into force in 1995 and was updated through amendments in November 2003. Federal agencies must conduct environmental assessments of development proposals requiring decisions under federal legislation (e.g., decisions under section 35 of the **Fisheries Act** or prior to issuing permits under the **Navigable Waters Protection Act** or the **National Energy Board Act**). The CEAA process requires the advice of relevant federal agencies to assess significant environmental effects in the planning of a project. Smaller and routine projects typically undergo a "screening" assessment, while larger and environmentally sensitive projects undergo a more intensive "comprehensive study".

In 1997, the **Ocean's Act** extended the Department's role in managing the use of marine resources and habitats. It called for the development of a national oceans management strategy guided by the principles of sustainable development, integrated management and an ecosystem perspective. Integrated management is a collaborative approach to decision-making that aims to balance the various interests in the marine and coastal environment, while incorporating conservation requirements. Ecosystem-based fisheries management considers the interactions between species and their environment, as well as the impact of fishing on the ecosystem. **Canada's Oceans Strategy**²⁸ released in 2002 defines an oceans-centred planning framework that combines these principles.

The **Species at Risk Act** (SARA) was proclaimed in June 2003, fulfilling a key national commitment under the United Nations Convention on Biological Diversity (see below). As one of two federal departments charged with SARA's implementation, DFO is responsible for protecting aquatic species at risk and their habitat. This responsibility includes the legal requirements to implement automatic prohibitions, develop recovery and action plans, plan and implement critical habitat protection, and conduct consultations within specified timelines.

► Guidance from the Courts Regarding Aboriginal Fishing Issues

DFO seeks to manage fisheries, including Aboriginal fisheries, in a manner consistent with *R. v. Sparrow* and subsequent decisions of the courts.

²⁷DFO (2001a), *Building Awareness and Capacity: An Action Plan for Continued Sustainable Development 2001–2003*.

²⁸DFO (2002b), *Canada's Oceans Strategy: Our Oceans, Our Future*.

As the Supreme Court of Canada stated in its 1996 decision in *R. v. Van der Peet*, an Aboriginal right is a practice, custom or tradition that was integral to the distinctive culture of an Aboriginal group at the time of contact between that group and Europeans. Accordingly, Aboriginal rights, by their very nature, have existed for a very long time. Rights under “historic treaties”, such as the Douglas Treaties, have also existed for a very long time in Canada. The only “modern treaty” in BC is the Nisga’a Final Agreement that applies to part of the northwestern part of BC. Other modern treaties are under negotiation in the British Columbia Treaty Commission process.

Although Aboriginal and treaty rights have existed in Canada for a very long time, those rights were not protected by the Constitution of Canada until 1982. In that year, section 35 was added to the Constitution. Section 35 states that existing Aboriginal and treaty rights are “recognized and affirmed”.

Starting with its 1990 decision in *R. v. Sparrow*, the Supreme Court of Canada has described a framework for the analysis of Aboriginal and treaty rights issues. The first step in the analysis is to determine whether an Aboriginal or treaty right can be established. If a right is established, the next step is to determine whether it has been infringed. If the right has been infringed, the court will consider whether the infringement can be justified. Courts continue to emphasize that analysis of Aboriginal and treaty rights issues must be done on a case by case basis.

With respect to the establishment of Aboriginal rights, the most important decision to date is the 1996 decision of the Supreme Court of Canada in *R. v. Van der Peet*. The Court held in that decision that an Aboriginal right is a practice, custom or tradition that was integral to the distinctive culture of an Aboriginal group claiming the right at the time of contact between that group and Europeans. In its 1997 decision in *Delgamuukw v. BC*, the Supreme Court of Canada clarified that Aboriginal title, i.e., a right of exclusive use and occupation, is a type of Aboriginal right and set out the test for establishing Aboriginal title.

In its decision in *R. v. Sparrow*, the Supreme Court of Canada held that the following factors should be considered in assessing whether or not a limitation (such as an action or decision) infringes an Aboriginal or treaty right:

- Does the limitation impose “undue hardship”?
- Is the limitation unreasonable?
- Does the limitation deny the holder of the right the “preferred means” of exercising the right?

If an Aboriginal group establishes a right, and that it has been infringed, the onus shifts to the Crown to justify the infringement. In *R. v. Sparrow*, the Supreme Court of Canada stated that “federal power must be reconciled with federal duty and the best way to achieve that reconciliation is to demand the justification of any government regulation that infringes upon or denies aboriginal rights”.

With respect to justifying infringements of rights to fish for food, social and ceremonial purposes, the Supreme Court of Canada held in *R. v. Sparrow* that the following factors should be considered:

1. Is there a “valid legislative objective” (e.g., conservation)?
2. Has the honour of the Crown been upheld?
 - Priority after conservation?
 - Adequate consultation?
 - As little infringement as possible?
 - Fair compensation (in a “situation of expropriation”)?

In its decision in *R. v. Sparrow*, the Supreme Court of Canada described a “valid legislative objective” as follows: “An objective aimed at preserving s. 35(1) rights by conserving and managing a natural resource, for example, would be valid. Also valid would be objectives purporting to prevent the exercise of s. 35(1) rights that would cause harm to the general populace or to aboriginal peoples themselves, or other objectives found to be compelling and substantial.” In its 1996 decision in *R. v. Nikal*, the Court acknowledged that “conservation” can include measures to reasonably increase fish stocks.

In its 1995 decisions in *R. v. Jack, John and John*, *R. v. Sampson and Elliot*, and *R. v. Little* (sometimes referred to as the “interception cases”), the BC Court of Appeal considered situations in which fish were harvested in mixed

stock interception fisheries while Aboriginal fisheries in terminal areas were limited. In its decision in *R. v. Sampson and Elliot*, the Court provided the following guidance: “We do not suggest that the DFO should prohibit all commercial and recreational fishing in the area of the interception fishery in Johnstone Strait. However, it is the responsibility of the DFO to implement a system which will conform to the priorities set forth in Sparrow.”

In all of the decisions in which the issue of priority has been considered, courts have carefully assessed the often complex facts relating to the how the Aboriginal, commercial and recreational fisheries were managed in the circumstances. It is clear that consideration of the issue of priority will always involve a detailed “case by case” analysis of the relevant facts.

With respect to consultation issues, significant guidance was provided by the Supreme Court of Canada in late 2004 in its decision in *Haida v. BC*. In that decision, the Court ruled that the Crown has a legal duty to consult with First Nations and, depending on the strength of the claim of Aboriginal rights or Aboriginal title and the seriousness of the potential adverse effect of a decision on the claimed rights or title, accommodate their interests when the Crown has knowledge of the potential existence of an Aboriginal right or Aboriginal title and is making decisions that might adversely affect the right or title. The Court held that scope of the duty will vary depending on the circumstances, including the strength of a First Nation's claim respecting the Aboriginal right or Aboriginal title and the potential impact of the government's decision on the claimed right or title. It is significant that, in its decision in *Haida v. BC*, the Supreme Court of Canada held that the Crown's legal duty to consult with an Aboriginal group can arise *even before* the group establishes any Aboriginal rights or Aboriginal title.

► Agreements

In 1985, Canada and the United States signed the **Pacific Salmon Treaty** requiring the conduct of fisheries so as to provide for optimum production and equitable exploitation of salmon stocks. Under the Treaty, each party is to receive benefits equivalent to the production of salmon originating in its waters, and each is to avoid undue disruption to the other's fisheries. Bilateral agreements must be periodically developed to implement the Treaty's principles for long-term conservation and harvest sharing. In addition, the Pacific Salmon Commission was established to advise both countries on the implementation of Treaty provisions.

Canada was the first industrialized nation to ratify the **UN Convention on Biological Diversity** signed by more than 150 countries at the 1992 Earth Summit in Rio de Janeiro. The Convention has three main goals: (1) the conservation of biodiversity; (2) sustainable use of the components of biodiversity; and (3) fair and equitable sharing of the benefits arising from the commercial and other use of genetic resources. In terms of defining at what level biodiversity should be conserved, it advocates the conservation of genes, species and ecosystems, without providing guidance on which one should receive priority.

In 1996, the federal, Provincial and Territorial governments signed the **Accord for the Protection of Species at Risk in Canada**. Under this agreement, the Canadian Endangered Species Conservation Council was created to determine responses to assessments made by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), the independent body of scientists responsible for designating the status of species.

After years of dispute over the conservation and harvest provisions of the Pacific Salmon Treaty, Canada and the US signed the **Pacific Salmon Agreement** in 1999. This agreement established abundance-based fishing regimes for the salmon fisheries under its jurisdiction. Two bilaterally managed regional funds were created to promote cooperation, improve fisheries management, and assist salmon and habitat enhancement efforts. The Agreement also included a commitment by the two countries to improve how scientific information is obtained, shared and applied to salmon management decisions.

The **North Pacific Anadromous Fish Commission (NPAFC)** was established by the **Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean** (the Convention) which became effective in 1993. The NPAFC includes Canada, Japan, the Republic of Korea, Russia, and the U.S., the primary states of origin for salmon stocks in the North Pacific. The Convention prohibits directed fishing for salmonids on the high seas of the North Pacific and includes provisions to minimize the number of salmonids taken in

other fisheries. The NPAFC promotes the conservation of salmonids in the North Pacific and its adjacent seas and serves as a venue for cooperation in and coordination of enforcement activities and scientific research.

On May 29, 1993, Yukon First Nations, Canada and Yukon signed the “**Umbrella Final Agreement**” under which treaties with individual Yukon First Nations would be negotiated. Since then, a number of such treaties (the “Yukon Final Agreements”) have been entered into between individual Yukon First Nations, Canada and Yukon. Some of the provisions of those treaties apply to the management of wild Pacific salmon.

The **Nisga’a Final Agreement**, the first “modern” treaty in British Columbia, took effect on May 11, 2000 after ratification of the Final Agreement by the Nisga’a Nation and the enactment of federal and Provincial settlement legislation. The Nisga’a Final Agreement applies to the management of salmon originating in the Nass Area, as defined in the Final Agreement. Other “modern” treaties are being negotiated between First Nations, Canada and British Columbia in the British Columbia Treaty Commission process.

► Policies and Programs

In 1986, DFO introduced the *Policy for the Management of Fish Habitat*²⁹ to provide guidance to Departmental staff, developers and the public on habitat conservation, restoration and development. The policy’s overall objective is a net gain in the productive capacity of fish habitat, using the guiding principle of “no net loss” to ensure that habitat is conserved.

The **Aboriginal Fisheries Strategy** (AFS) was launched in 1992 in response to the Supreme Court of Canada’s Sparrow decision on the Aboriginal food fishery.³⁰ The AFS program is applicable where DFO manages the fishery and where land claims settlements have not already put a fisheries management regime in place. It seeks to provide for the effective management and regulation of fishing by Aboriginal communities through negotiation of mutually acceptable and time-limited agreements between the Department and Aboriginal groups.

In 1998, *A New Direction for Canada’s Pacific Salmon Fisheries*³¹ established conservation as the primary objective for managing the wild salmon resource. The new policy set out 12 broad principles in the areas of conservation, sustainable use and improved decision-making. It stated that conservation should take precedence over other uses and that a precautionary approach to fisheries management should be adopted.

New Directions called for more detailed policies to put its principles into operation. *An Allocation Policy for Pacific Salmon*³² confirmed the precedence of conservation and described a balanced allocation among the commercial, recreational and aboriginal fisheries once conservation requirements have been met. *A Policy for Selective Fishing in Canada’s Pacific Fisheries*³³ outlined principles and an implementation framework for selective harvest practices, as part of a long-term conservation and sustainable use strategy. For improved decision-making, there is work underway to create stakeholder committees that will help develop salmon harvest plans, as well as a formal public policy advisory process.

The **Aboriginal Aquatic Resource and Oceans Management Program** (AAROM) announced in October 2003 will help Aboriginal groups acquire expertise to participate more effectively in processes for aquatic resources and oceans management.³⁴ A major objective of AAROM is to provide these groups with the capacity to contribute to technical and advisory committees in areas of DFO responsibility, including fisheries and habitat management and oceans planning and management.

²⁹DFO (1986), *Policy for the Management of Fish Habitat*.

³⁰See www.dfo-mpo.gc.ca/communic/fish_man/afs_e.htm.

³¹DFO (1998), *A New Direction for Canada’s Pacific Salmon Fisheries*.

³²DFO (1999), *An Allocation Policy for Pacific Salmon*.

³³DFO (2001b), *A Policy for Selective Fishing in Canada’s Pacific Fisheries*.

³⁴See www.dfo-mpo.gc.ca/media/backgrou/2003/hq-ac99a_e.htm.

APPENDIX 2. A STRUCTURED FIVE-STEP PLANNING PROCEDURE

Developing integrated strategic plans for individual CUs and groups of CUs will need extensive detailed information on the status of wild salmon, their habitat and ecosystem to be brought together and collated with information on fisheries and watershed activities. In addition, broad based input on possible management actions and their potential impacts will need to be received, considered and discussed in an organised way to arrive at reasoned and informed management decisions. The range of information that will need to be processed and the complex and sometimes controversial nature of the issues involved calls for a formal, structured and open procedure to be used in developing strategic plans.

The five-step planning procedure outlined below is proposed in this policy to assist in strategic planning. This procedure breaks down decision-making into a logical and manageable sequence that reflects standard decision-making practices in many private and public agencies.³⁵ In addition, it is designed to enhance integration and open up current salmon planning processes to greater public involvement. It provides for improved dialogue among the affected parties and enables them to participate throughout the development of plans from the establishment of planning priorities to the identification of management alternatives, their evaluation and the selection of a preferred management alternative.

In the longer term, the application of the planning procedure and the development of integrated salmon plans will be the primary responsibility of appropriate representative planning bodies within a new integrated planning structure (Action Step 4.2). In the interim, the Department will bring together First Nations and various interests from existing planning processes, as needed, to provide focused recommendations for conservation and re-building conservation units that are in low abundance (Action Step 4.1).

► Step 1 Identify planning priorities

As a starting point for planning, DFO staff will provide an overview report that identifies the CUs exploited by fisheries within each planning unit and gives summary information on their biological status (Red, Amber or Green). Key habitat and ecosystem constraints or threats to individual CUs will also be summarised by watershed. For CUs in the Red zone more detailed reports will also be provided as they become available. These detailed reports will consider and incorporate ATK, where available, and be subject to peer review through PSARC.

Based on this information and their knowledge of local circumstances, First Nations and other participants in the planning process will be asked to develop key priorities for the each planning unit. These priorities will be established consistent with the WSP objectives and principles, and will include the re-building of CUs where these fall below their established lower benchmarks. However, priorities may also include rebuilding or enhancing returns of wild salmon where these are below their sustainable production potential, or maintaining harvest levels in First Nations or other fisheries.

For every planning unit, Step 1 will provide a list of specific key priorities that are to be addressed in the development of integrated salmon management plans.

► Step 2 Identify resource management options and alternative management strategies

At Step 2, several alternative management strategies will be developed in consultation with First Nations and other participants in the planning process. Specific management options proposed may include fisheries management measures such as fishing time and area restrictions or habitat restoration activities or watershed

³⁵ See for example Schlenker-Goodrich (2003), *A Conservationist's Guide to BLM Planning and Decision-Making: Using FLPMA and NEPA to Protect Public Lands*.

development constraints or enhancement initiatives. At this stage in the planning process it will be important that no realistic management option is eliminated from consideration. The specific options identified through these consultations will be used either singly or in combination to develop two or more alternative strategies for addressing the management priorities for the planning unit.

For every planning unit, Step 2 will provide a number of alternative strategies that reflect a realistic range of different approaches to addressing the management priorities for each planning unit.

► Step 3

Establish biological, social, and economic performance indicators

At Step 3, input from First Nations and other participants in the planning process will be used to develop an evaluation framework for comparing the management alternatives developed in Step 2. This will require First Nations and others to identify explicit, measurable performance indicators applicable to the planning unit, its component CUs and their underlying local populations. These indicators should be suitable both to rate and rank the likely performance of each management alternative before making decisions, and to assess performance over time following decision-making and implementation. The indicators should directly relate to the biological objectives (safeguard the genetic diversity of wild salmon and maintain the integrity of their habitat and ecosystem) and the social and economic objectives (manage fisheries for sustainable benefits) of the WSP. To be useful, the indicators collectively will need to fully reflect the concerns and interests of First Nations and other participants in the planning process.

For each planning unit, Step 3 will provide a credible, broadly accepted management assessment framework that captures and reflects all significant biological, social, and economic considerations.

► Step 4

Assess the likely impacts of management alternatives

At Step 4, the alternative management strategies identified in Step 2 will be evaluated using the performance indicators developed in Step 3. The evaluation process will be forward-looking and focused on estimating the "future" impacts (both positive and negative) of each strategy on each of the indicators for the planning unit. These predictions will need to reflect the uncertainties and risks associated with each management alternative.

Under the Wild Salmon Policy, DFO will play a lead role in providing or obtaining these predictions from appropriate technical experts. For some planning units, computer simulation models may be available to assist, but in other cases it will be necessary to rely on expert opinion. To facilitate comparison between management alternatives the likely "net effect" of each management alternative relative to a common base case (e.g. status quo management) on all of the selected indicators for the planning unit will be projected for appropriate time periods.

Step 4 will provide a set of predicted outcomes for each alternative management strategy.

► Step 5

Select the preferred management alternative

The predicted outcomes from Step 4 will help in selecting a preferred management strategy. In many cases, tradeoffs will be apparent among different biological, social, and economic indicators. It is anticipated that differences of opinion will occur between individuals and interest groups about the "best" alternative because of their different priorities and tolerances to risks.

The goal will be to use constructive dialogue among First Nations and others involved in the planning process to resolve these differences, find compromise solutions and to develop consensus recommendations wherever possible for each planning unit. In the absence of consensus, differences of view will be fully

documented to inform final decision-making. The Minister of Fisheries and Oceans will consider the input received and will make the final decisions. Records of all decisions will be made available to the public.

The decisions made for each planning unit will collectively form the regional strategic plan for the management of fisheries and watersheds. The plan will include activities and management actions to be undertaken over a medium- to long-term timeframe. It will also stipulate explicit biological targets to be achieved for individual Conservation Units and groups of CUs and, where appropriate, anticipated timeframes for rebuilding. All of this information will be documented in an Integrated Management Plan for Pacific salmon.

One of the challenges in successfully managing wild salmon is to achieve consensus on how to address conservation concerns while accounting for the social and economic impacts of alternative management actions. In the planning process described here, the interested parties will be directly engaged throughout the development of management plans from the establishment of planning priorities through to the evaluation and selection of the preferred management alternative. The deliberations will be guided by the principles and objectives expressed in the WSP, and the acceptability of the recommended management actions will be determined by the degree to which they advance the overall policy goal of restoring and maintaining healthy and diverse salmon populations for the benefit and enjoyment of the people of Canada in perpetuity.

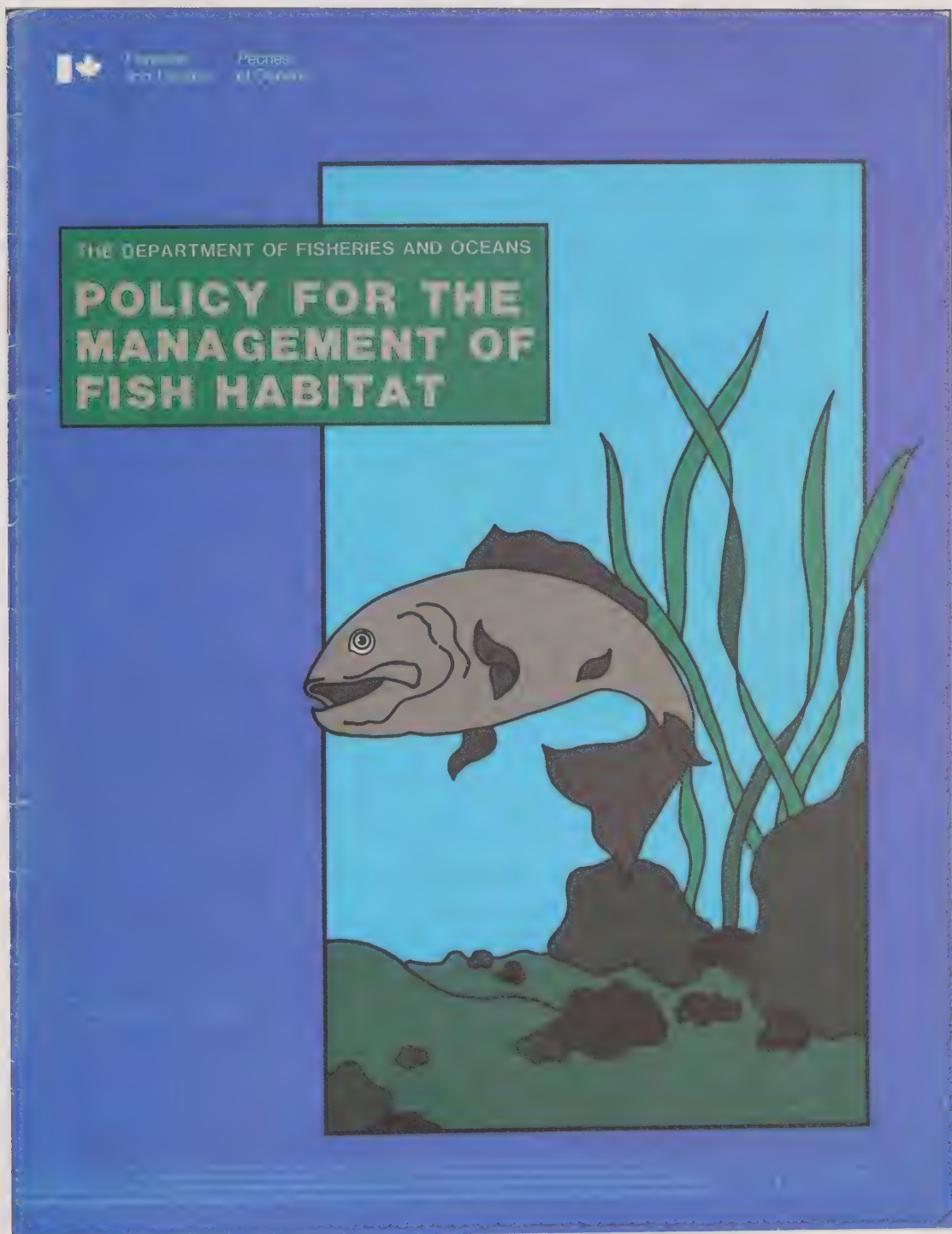
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Appendix C • 1986 Habitat Policy





**THE DEPARTMENT OF
FISHERIES AND OCEANS
POLICY
FOR THE
MANAGEMENT
OF
FISH HABITAT**

**DEPARTMENT OF FISHERIES AND OCEANS
Ottawa, Ontario**





FOREWORD

This new policy on fish habitat management is an explicit recognition by the federal government that fish habitats are national assets.

It is, I believe, an ambitious but realistic policy, designed to achieve a Net Gain of habitat for Canada's fisheries resources in a manner that will be of benefit to all users. It does this by providing a comprehensive framework for the conservation, restoration and development of fish habitats and strategies for the implementation of its various components.

The policy is also a blueprint for a common-sense, cooperative approach between the private sector and various levels of government. It reflects, in particular, the willingness of this Minister and this department to work cooperatively with all parties. The policy is itself the result of extensive federal, provincial, territorial and private sector consultation and cooperative effort.

It is, in short, a policy based on a confidence in the ability of Canadians to work together to arrive at solutions to problems and to harness creative energies in order to increase the social and economic benefits derived by Canadians from productive fish habitats and the fisheries resources they support.

I look forward to the continued cooperation of all interested parties in the implementation of this policy.

Tom Siddon, M.P., P.C.
Minister of Fisheries and Oceans

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CHAPTER ONE

A FEDERAL PERSPECTIVE ON FISH HABITAT MANAGEMENT



1.1 Introduction

This document provides Canadians with a statement of the Department of Fisheries and Oceans' policy objectives, goals and strategies for the management of fish habitats supporting Canada's freshwater and marine fisheries. Fish habitats constitute healthy production systems for the nation's fisheries and, when the habitats are functioning well, Canada's fish stocks will continue to produce economic and social benefits throughout the country.

The policy provides objective statements against which the Department can measure its performance in fish habitat management and offers a framework for more consistent administration of the Department's habitat management program. It signals a renewed effort by the Department of Fisheries and Oceans to increase the social and economic benefits derived by Canadians from productive fish habitats and the fisheries resources they support.

In a broader sense, this policy will contribute to the management of human use of the biosphere, so that it may yield the greatest sustainable benefit to mankind.

The Department of Fisheries and Oceans developed this policy framework following public release of a discussion paper in 1983 and of a proposed policy and procedures paper in 1985. In the course of the public discussion that followed, it became clear that an improved approach was needed to manage fish habitat and to consider opposing views before habitat decisions are taken. In particular, it became clear that integrated resource planning, combined with better integration of habitat and fisheries management objectives, must

become more widely applied in fish habitat management.

Under the federal *Fisheries Act*, "fish habitats" are defined as those parts of the environment "on which fish depend, directly or indirectly, in order to carry out their life processes". The *Act* also defines "fish" to include all the life stages of "fish, shellfish, crustaceans, marine animals and marine plants". Accordingly, pursuant to the *Act*, this policy will apply to all projects and activities, large and small, in or near the water, that could "alter, disrupt or destroy" fish habitats, by chemical, physical or biological means, thereby potentially undermining the economic, employment and other benefits that flow from Canada's fisheries resources.

Fish habitats can be damaged in ways both obvious and subtle, and by changes big and small. A multi-million dollar hydro project can take its toll on a spawning run of fish, but so can a poorly-installed culvert under a farm lane. Among the most common threats to fish habitats are those associated with industrial and municipal liquid waste discharges; stream diversions; introduction of silt; barriers to migration; alteration of flow; nutrient imbalances; acid rain and other airborne pollutants; pesticides; and other chemical, physical and biological agents.

Fish are an important part of Canada's renewable resource base. The commercial and recreational fisheries contribute several billion dollars annually to the national economy. Fish and their habitats are also a valuable tourist attraction, generating local income quite apart from fishing activities. In addition, there are social benefits that flow from the fishery resource, such as support for traditional lifestyles in remote communities. Finally, to many Canadians, the simple knowledge that the fish



are there serves as a strong indicator of a healthy environment. With wise management, habitats may be conserved, restored and developed so that the fisheries resource will provide increasing benefits to the nation in perpetuity.

1.2 National Application

The policy will apply to those habitats directly or indirectly supporting those fish stocks or populations that sustain commercial, recreational or Native fishing activities of benefit to Canadians. In addition, Fisheries and Oceans recognizes its responsibility to protect and increase fish stocks and their habitats that have either a demonstrated potential themselves to sustain fishing activities, or a demonstrated ecological support function for the fisheries resources. In accordance with this philosophy, the policy will not necessarily be applied to all places where fish are found in Canada, but it will be applied as required in support of fisheries resource conservation.

Under the *Constitution Act* (1982), the federal government has authority for all fisheries in Canada, and it retains direct management control of fisheries resources in the Atlantic Provinces of Newfoundland, New Brunswick, Nova Scotia and Prince Edward Island; for the marine and anadromous salmon fisheries of British Columbia; for the marine fisheries of Quebec; and for the fisheries of the Yukon and Northwest Territories. In addition, the federal government becomes involved in transboundary situations where undertakings in one province or territory threaten fish habitat in another.

Following references to the Privy Council and several Court decisions, formal agreements were negotiated during the period 1899 and 1930 between the federal government and a number of provinces. As a result, the federal government has made special arrangements concerning day-to-day management for the inland fisheries of Ontario, Manitoba, Saskatchewan and Alberta, and for some fisheries in the provinces of Quebec (where the province manages all freshwater, anadromous and catadromous fisheries), and British Columbia (where the province manages all freshwater species, excepting anadromous salmon). In these six provinces (or parts thereof), federal fisheries legislation is administered by the provincial fisheries management agency, although provincial fisheries regulations must be promulgated by the federal government. Conservation Officers in several provinces are designated as Fishery Officers for purposes of administering the *Fisheries Act*.

The Department recognizes that experienced freshwater fisheries management agencies, with the capability

to administer statutes and regulations, and to manage fish habitats on behalf of users of the fisheries resource, have evolved in the six provinces (or parts thereof) identified in the preceding paragraph. The federal government will not actively apply this policy in those jurisdictions; rather the provincial agencies concerned will be encouraged to apply it through bi-lateral administrative agreements and protocols which will also clarify roles and responsibilities for the respective parties involved. Also, inter-agency referrals and other forms of federal-provincial cooperation will continue to be used and agreements developed in those other provinces and territories where the Department of Fisheries and Oceans administers fisheries legislation directly.

It follows that the application of this policy by the Department of Fisheries and Oceans will be primarily in freshwaters, estuaries and coastal situations where most damage to fish habitats has taken place and where the risk of future damage is highest. In the marine waters on Canada's continental shelves, the policy will also apply, the main areas of interest being: (1) the surveillance and control of chemical hazards introduced, or that may be introduced, by man's activities, and (2) managing the potential adverse effects of ocean dumping, shipping and oil and gas exploitation activities. The policy will be applied to projects and activities of any scale, large or small, to avoid cumulative losses of habitats that support Canada's fisheries resources.

Within the Department, a national plan and timetable will be developed for a phased program of policy implementation, giving due consideration to regional priorities and program resource requirements for habitat management.

1.3 International Considerations

Fish habitat management policy serves the objectives of more than just the federal fisheries programs in Canada. The habitat management program of the Department of Fisheries and Oceans helps to fulfill Canada's commitment to the United Nations' World Conservation Strategy, part of which calls for "the maintenance of the support systems for fisheries and for the control of pollution".

The Department will continue to address concerns for fish habitat management in international forums whose mandates have a bearing on fish habitat objectives. The International Joint Commission and the Great Lakes Fishery Commission will be supported in addressing bilateral issues that have a bearing on the health of fisheries resources. Advice will be provided, through the Departments of External Affairs and Transport, to the



International Maritime Organization (IMO) and the Marine Environmental Cooperative Agreement (MECA) on the subject of hazardous cargoes at sea, and environmental issues related to marine transport. Furthermore, technical and policy input will be provided by the Department in support of the Canadian position at the London Dumping Convention. The Department will also continue to cooperate with both the Organization for Economic Cooperation and Development (OECD) and the International Council for the Exploration of the Sea (ICES) in their efforts to coordinate international research, monitoring and assessment programs.

The Department will support and provide advice to various international organizations in their efforts to help conserve the global aquatic resources from threats such as radioactive contamination, acid rain, the build-up of carbon dioxide in the atmosphere, and other detrimental climatic alterations.

1.4 *Support for Government Priorities*

The wise management of fish habitat supporting Canada's productive fisheries will ensure that the socio-economic benefits and employment generated by the fisheries sector are not forfeited by actions in other economic sectors and that the concerns of those other

sectors are taken into account. Direct benefits of the policy will be as outputs from various fisheries activities: sometimes as a source of food; or as wholesome fish caught and sold; or as income and pleasure from the vast amount of recreational fishing taking place in Canada.

Government, private sector and citizen-initiated projects to restore degraded habitats will generate employment opportunities. Furthermore, the Department of Fisheries and Oceans recognizes the potential impact of fish habitat decisions on regional development, industrial development, other resource sectors, and public projects. The Department will consider the interests of other resource users and will strive under this policy to take reasonable, timely and consistent decisions to maintain and improve the productive capacity of fish habitats.

It is recognized that Native peoples could assume a greater role in local fisheries management and environmental protection in future. Through this policy, Fisheries and Oceans offers useful approaches for effective habitat conservation that could be implemented within the context of both Native claims and self-government. The Department is prepared to cooperate with Native groups and the appropriate provincial or territorial fisheries agencies to develop programs, techniques and approaches to improve fish habitat management within their areas of interest.





CHAPTER TWO

THE POLICY

2.1 Policy Objective

NET GAIN OF HABITAT FOR CANADA'S FISHERIES RESOURCES

Increase the natural productive capacity of habitats for the nation's fisheries resources, to benefit present and future generations of Canadians.

Interpretation

1. The Department of Fisheries and Oceans' long-term policy objective is the achievement of an overall **net gain** of the productive capacity of fish habitats. Progress toward this objective can be achieved through the active conservation of the current productive capacity of habitats, the restoration of damaged fish habitats and the development of habitats as depicted in Figure 1 and further described in this chapter. Increases in the productive capacity of fish habitats are considered to be possible for anadromous and certain freshwater and shellfish species in the short-term; but gains through habitat modification for strictly marine species will be more limited in most instances.
2. The habitat programs of the Department of Fisheries and Oceans, assisted by cooperative undertakings with other federal departments, provincial and territorial governments, private industry and non-government groups, will be administered to achieve this policy objective for the nation's fisheries resources through various protection measures

and resource planning initiatives, as outlined in Chapter 3.

3. The strategies for achieving conservation and protection of habitat are described in further detail in the following chapters. Strategies for achieving the restoration and development goals are in the developmental stage, and the Department will cooperate with other agencies and the private sector in further expanding research, technology, and procedures that will contribute to the effective application of the **net gain** policy objective.
4. In accordance with the implementation strategies outlined in Chapter 4, this policy objective is applicable to all threats to the productive capacity of fish habitats, including water pollution, acid rain, biological agents, and any type of physical disruption.
5. Under a 1985 Memorandum of Understanding with Environment Canada, respective responsibilities for the administration of Section 33 of the *Fisheries Act* have been clarified. Under the terms of the Memorandum, the Minister of Fisheries and Oceans continues to be legally responsible to Parliament for all sections of the *Act*. For Section 33, Environment Canada continues to administer those aspects dealing with the control of pollutants affecting fish, in cooperation with the Department. Fisheries and Oceans will cooperate with Environment Canada in the establishment of federal priorities for the protection of fish and their habitats from deleterious substances.

2.2 The First Goal

FISH HABITAT CONSERVATION

Maintain the current productive capacity of fish habi-



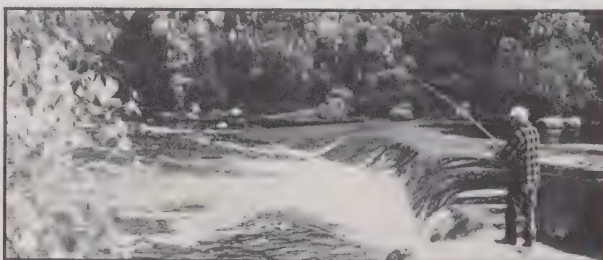
tats supporting Canada's fisheries resources, such that fish suitable for human consumption may be produced.

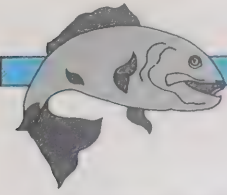
Interpretation:

1. The level of protection given to habitats under this goal will take into consideration their actual or potential contribution to sustaining the nation's fisheries resources, as defined in this policy, and in accordance with local fisheries management objectives, as described in section 3.3.
2. Where there is a risk of potential damage to habitat, the Department will strive to prevent losses of natural fish production areas, in order to produce fish in perpetuity and to help maintain genetic diversity. This will contribute to the Department's fish production goals and reduce the costs associated with constructing and maintaining fish production facilities, and restoring damaged habitats.
3. In accordance with the Protection and Compliance Strategy explained in Chapter 4, the habitat provisions of the *Fisheries Act* will be administered and enforced to control the negative impacts of existing and proposed projects and activities that have a potential to alter, disrupt and destroy habitats. Section 33 of the *Act* contains specific powers to control the release of deleterious substances into fish habitats and is administered by Environment

Canada, in cooperation with Fisheries and Oceans, frequently in close collaboration with provinces.

4. There are limitations respecting the use of the *Fisheries Act* to control widespread activities on an ecosystem-wide basis, such as land use developments and the release of air pollutants. Notwithstanding these limitations, the Department will continue to cooperate with other agencies and other levels of government in an effort to implement resource management procedures on an ecosystem basis.
5. In its efforts to control ocean pollution and the chemical contamination of fish and fish habitats, Fisheries and Oceans will continue to cooperate with and provide criteria for fisheries protection to provinces, territories and a number of federal departments, including Agriculture Canada, Environment Canada, Transport Canada, Energy, Mines and Resources, External Affairs, Indian and Northern Affairs, and the Canada Oil and Gas Lands Administration.
6. The Department will cooperate with and encourage provinces, territories and other land owners and managers, to identify unique and productive habitat areas and to include them within a network of protected areas for the production of fisheries and other natural resources. For marine areas, the





Department will also consider taking direct action to establish sanctuaries for the preservation of living marine resources and associated habitats, consistent with fisheries management objectives and emerging federal government objectives for arctic marine conservation. The Department will also cooperate with and support conservation organizations in the promotion and establishment of protected areas consistent with this policy.

7. The conservation goal will be implemented using the **no net loss** guiding principle, as described in the next section.

2.2.1 The Guiding Principle:

NO NET LOSS OF THE PRODUCTIVE CAPACITY OF HABITATS

Interpretation:

1. The **no net loss** principle is fundamental to the habitat conservation goal. Under this principle, the Department will strive to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss or damage may be prevented.
2. The principle applies to proposed works and undertakings and it will not be applied retroactively to approved or completed projects.
3. The principle is intended to guide departmental officials and other interested parties, and should not be interpreted as a statutory requirement to be met at all costs and in all circumstances. Professional judgement and common sense applied in an informed, cooperative environment by personnel experienced in habitat management, combined with supportive research, will achieve **no net loss** of productive capacity in the majority of cases.
4. The principle takes into consideration the habitat requirements of fish, in the context of site-specific evaluations, in order to avoid losses of habitats or habitat components that can limit the production of fisheries resources.
5. The principle may be applied on either a fish stock-specific basis, or on a geographic area basis, depending on how particular fisheries are managed and harvested. In cases where a mixture of stocks

is fished, stock-specific application of the principle is important, for example, with most anadromous salmon. If the affected fish stocks and habitats are adjacent to Native communities, it will be important that any habitat replacement be undertaken in the immediate area to avoid any negative effects on Native fishing rights. In other circumstances, such as for resident freshwater species, the principle may be applied on a broader, geographic area basis, rather than on stock-specific management. Local fish habitat management plans, where available, will guide the application of the principle in specific cases.

6. Through the hierarchy of preferences and other procedures explained in Chapter 5, the principle offers flexibility in the search for solutions by both fisheries managers and the proponents of works and undertakings that may threaten fish habitats.
7. In addition to its application to physical disruptions, the principle will apply to proposed industrial and municipal liquid waste discharges that could degrade water quality and the productive capacity of fish habitats. This will be accomplished by careful site selection, combined with mitigation measures that incorporate best practicable technology, to avoid and control adverse effects. Compensation-in-kind is not a feasible option in cases involving liquid waste discharges.
8. Various other techniques, including those used to restore and develop habitat, may be employed by proponents to achieve **no net loss** and the conservation goal. In cases where the productive capacity of habitats is very high, no loss of habitat and no degradation of water quality will be permitted, in accordance with the local fish habitat management plan, wherever available.

2.3 Second Goal

FISH HABITAT RESTORATION

Rehabilitate the productive capacity of fish habitats in selected areas where economic or social benefits can be achieved through the fisheries resource.

Interpretation:

1. The productive capacity of habitat may be increased by the restoration of damaged fish habitats. This will complement the preventive approach provided



- for in the conservation goal and will contribute to the achievement of **net gain** of habitat for the nation's fisheries resources.
2. The biological components and chemical quality of water will be restored and physically disrupted habitats will be repaired, as described in the implementation strategy on habitat improvement.
 3. This goal requires the continuing support of scientific research to discover and test new methods for restoring the productive capacity of fish habitats.

2.4 Third Goal

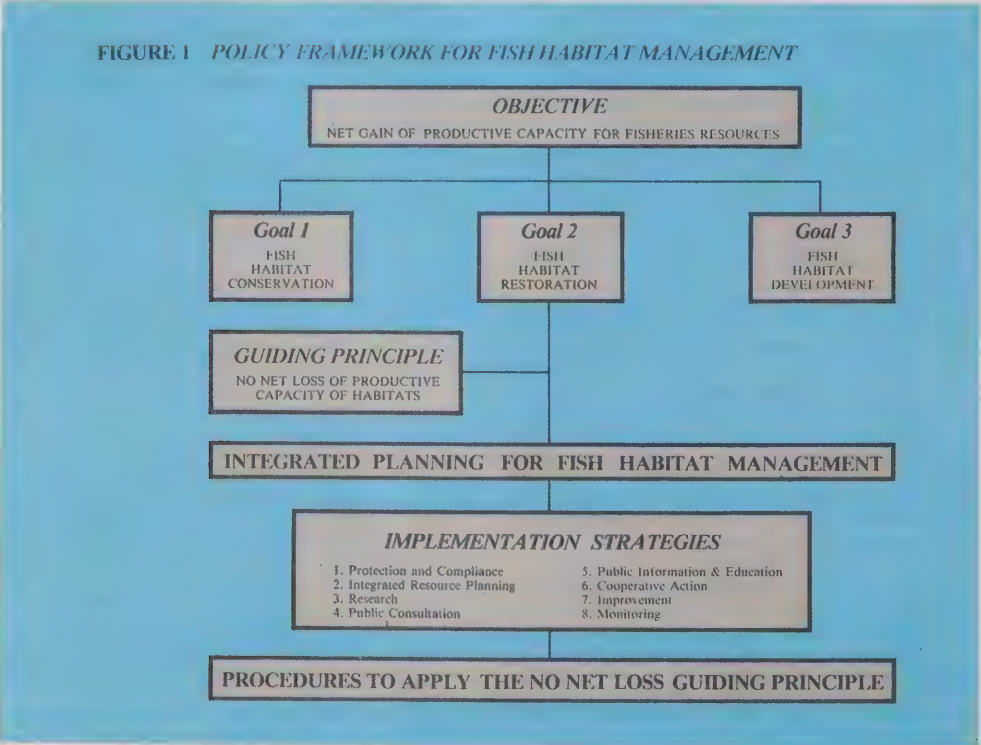
FISH HABITAT DEVELOPMENT

Improve and create fish habitats in selected areas where

the production of fisheries resources can be increased for the social or economic benefit of Canadians.

Interpretation:

1. The productive capacity of habitats may be increased by manipulating naturally occurring chemical, physical, and biological factors, and creating, or providing access to, new spawning, rearing and food producing areas.
2. The objective of this goal is to generate national and regional economic and social benefits for Canadians, and to assist in achieving a **net gain** of habitat for fisheries resources.
3. This goal requires the continuing support of scientific research to discover and test new methods for increasing the productive capacity of fish habitats.





CHAPTER THREE

INTEGRATED PLANNING FOR FISH HABITAT MANAGEMENT

3.1 Introduction

The net gain objective and three supporting goals of this policy will be implemented by a series of strategies that are outlined in the following chapter. In addition to this, improved integration is needed to ensure that the fish habitat plans are implemented with sufficient knowledge of the current and future demands of other natural resource users. This can be accomplished by utilizing existing processes and continuing to develop regularized procedures as required, in close cooperation with provinces, territories and other sectors engaged in resource utilization and management, to consult and plan for future resource management and use.

Furthermore, it will not be sufficient to proceed with policy implementation without fully integrating fish habitat requirements with management objectives for the fisheries resources. This will allow meaningful priorities to be established and will lead to more credible delivery of all elements of the fisheries management program.

This chapter outlines the conceptual approaches that must be tested, implemented and further developed to allow for the fuller integration of fish habitat management in multiple resource management decisions.

3.2 Integration with Other Resource Sector Objectives

The Department recognizes that other natural resource interests such as the forest, mining, energy, and agricultural sectors make legitimate demands on

water resources, and that ways must be found to reconcile differences of opinion on their best use. Effective integration of resource sector objectives, including fisheries, will therefore involve cooperation and consultation with other government agencies and natural resource users. For example, fish habitat management plans on a local or regional basis will be developed in such a way as to allow involvement with other stakeholders. In particular, in those jurisdictions where the Department of Fisheries and Oceans manages fisheries directly, it will seek ways to participate in the resource planning and management initiatives of provincial, territorial and municipal governments, other federal departments and other resource users where applicable. In other jurisdictions, integrated planning activities will be consistent with any federal-provincial administrative agreement for habitat management. Examples of initiatives in which the Department has been involved in recent years include (a) planning for multiple land and water use in a number of west coast estuaries and in the Nicola River Basin in British Columbia; (b) planning for port development on the east and west coasts; (c) planning for resource use in Passamoquoddy Bay, New Brunswick; and (d) preparation for Northern Land Use Planning in the territories.

In this way, and in keeping with the integrated resource planning strategy described in the next chapter, fish habitat management plans will be reviewed and discussed, and, where possible, integrated with the objectives and plans of other resource managers and users.



3.3 *Integration of Habitat Needs with Fish Management Objectives*

The essential step of integrating various fish habitat requirements with the fisheries resources they support, must be undertaken and made available in a form that is understood by officials within Fisheries and Oceans, as well as by other agencies and non-government groups. The Department has explored the conceptual basis for this integration and has concluded that fish habitat management area plans should be developed to guide the implementation of this policy.

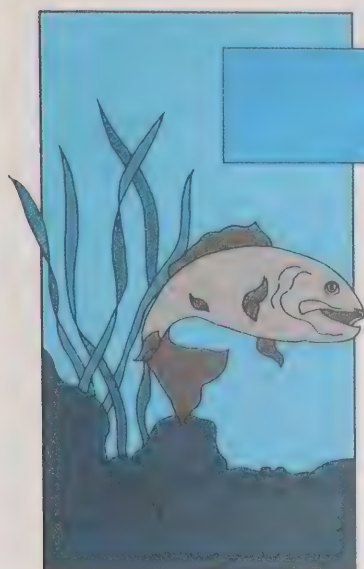
These plans would be relatively straightforward to implement if fish stock production objectives and allocation plans were available for all of the nation's important fisheries resources. While this information is commonly available from the responsible fisheries agency, or can be developed by that agency, it is not always possible for fisheries managers to either identify discrete fish stocks for allocation purposes or to quantify production targets for stocks and geographic areas.

Given the above factors, the integration of fish habitat requirements with fisheries management objectives to reflect the important supporting role played by the

habitat program could be developed in a variety of ways. The method used will depend on the information available on fish production from particular areas and on the complexity of fish harvesting for mixed stocks. If both the stocks and the fisheries are discrete, it should be possible to derive production targets on which to base habitat management plans that would support the maintenance and growth of those fisheries in particular areas.

A different approach will have to be taken where the fish produced in particular areas contribute to a mixed-stock fishery. In such instances, where stock-specific fish production targets cannot be provided by fisheries managers, estimates of those targets may be based on habitat availability, its quality, any competing pre-emptive uses and historic fish production levels. This will form the basis for the fish habitat management plan for that geographic area.

The plans developed in this way will be used to define those specific areas where this habitat policy will apply and to assist the Department in its efforts to measure program performance. In addition, the habitat management plans will be used as the basis for discussion with other resource managers and users, during the integration process described in the preceding section.



CHAPTER FOUR

IMPLEMENTATION STRATEGIES

4.1 First Strategy

PROTECTION AND COMPLIANCE

Protect fish habitats by administering the Fisheries Act and incorporating fish habitat protection requirements into land and water use activities and projects.

General Interpretation:

1. The procedures for implementing the **no net loss** guiding principle, as described in Chapter 5, will be used as an integral part of this strategy to deal with proposed works and undertakings that could affect the fisheries. In addition, existing habitat problems will be addressed under this strategy.
2. The Department will ensure a uniform and equitable level of compliance with statutes, regulations and policies, as necessary to manage and protect fish habitats in jurisdictions where the federal government manages fisheries. The *Fisheries Act* contains powers to deal with damage to fish habitat, destruction of fish, obstruction of fish passage, necessary flow requirements for fish, the screening of water intakes and the control of deleterious substances. Potential adverse effects on fish habitats are frequently avoided by modifying the plans, designs and operating procedures for projects and activities, and by incorporating mitigation and compensatory measures.
3. The Department will, through collaboration with Environment Canada and the Department of Indian

and Northern Affairs where appropriate, provide timely advice and specific requirements to any person, company or agency engaged in or responsible for work in or near the water, in an effort to control the potential adverse effects on fish habitats of liquid effluent discharges, water withdrawals, physical disturbances, non-point-sources of chemical pollutants such as pesticides, other environmental contaminants, and the introduction of exotic species, predators, parasites and competitors.

4. In jurisdictions where Fisheries and Oceans manages the fisheries and in recognition of the need to avoid cumulative habitat losses caused by small projects, the Department will participate with the provinces, territories and other federal departments in reviewing plans for activities regulated by other levels of government or other departments, in an effort to resolve, through inter-agency cooperation, potential resource conflicts involving fish habitat. In the course of such participation and consultation, while the Department will be prepared to use the habitat provisions of the *Fisheries Act*, it will also be prepared, as a first preference, to agree to solutions involving the use of other federal or provincial legislation, particularly when another agency is acting as the lead, and provided the solutions are consistent with the requirements of the *Act* and this policy.
5. The Department will work closely with Environment Canada in the administration of Section 33 of the *Fisheries Act*, to control effluent discharges and maintain receiving water quality for the fisheries resource. In accordance with the memo-



random of understanding between the two Departments, Fisheries and Oceans will collaborate with Environment Canada and the provinces and territories in identifying fisheries protection requirements. With respect to administration of Sections 20, 31 and other sections of the *Act*, where aspects of a project involve physical activities that could potentially disrupt fish habitat, the Department will work directly with the proponent, and will provide advice and input to referrals and permits managed by the provinces, territories or other federal agencies.

Proponent Responsibilities:

1. Pursuant to Section 33.1(1) of the *Fisheries Act*, proponents may be asked by the Minister of Fisheries and Oceans or his officials, to provide a statement of information so that the Department can assess the potential impact of existing or proposed works and undertakings on the fisheries resource. Usually such requests would apply to major projects, as defined in this document. The statement may include project-specific information on the resource in question, its supporting habitat and baseline fisheries information required to assess the potential impact of a proposed project. The terms of reference for such information statements should be developed by the proponent, in consultation with professional and technical staff of Fisheries and Oceans. To avoid delays in the assessment of projects, proponents should provide these statements on a timely basis.
2. Proponents may use the results and data of departmental scientific studies on fisheries and oceans to

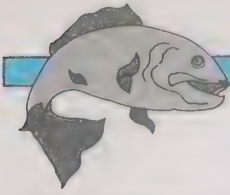


supplement their project-specific assessments.

3. The cost of mitigating any anticipated damages, and for implementing compensation measures and facilities designed to avoid losses of fish habitat and reductions in the supply of fish, will be the responsibility of proponents. Proponents will also be responsible for the costs of operation and maintenance of any such facilities.
4. The costs to government of activities undertaken to clean up spills of oil and other pollutants will be recovered, under Section 33(10) of the *Act*, from the person(s) who caused the damage, or from special financial security instruments pursuant to the *Oil and Gas Production and Conservation Act*.

Major Project Review Procedures

1. The Department will conduct detailed reviews, frequently and preferably as a participant in a provincial or federal environmental review process, of major proposed industrial undertakings that could potentially harm habitats supporting the fisheries resources.
2. The Department recognizes the importance of timely approvals in the context of minimizing costs, assisting economic growth and providing new employment opportunities. In addition, the Department frequently collaborates closely with officials in other government agencies to discuss findings and review courses of action.
3. For major development projects, a senior level Habitat Policy Steering Committee chaired by an Assistant Deputy Minister of Fisheries and Oceans will provide overall guidance and direction respecting the Department's actions by:
 - (i) ensuring the consistent application of departmental and government policy;
 - (ii) consulting as required with project proponents, senior representatives of other government agencies and other interested parties;
 - (iii) receiving reports, briefings and draft departmental position statements from the Regional Project Committee; and
 - (iv) recommending approvals, restrictions and prohibitions to the Deputy Minister and arranging for delivery of the departmental position to the proponent.
4. A Regional Project Committee reporting through the Regional Director-General to the Habitat Policy Steering Committee will be formed by the Depart-



ment for each major project to carry out the following:

- (i) establish contact at the management and working level with the proponent and with officials of other departments and levels of government;
- (ii) outline the Department's technical information requirements;
- (iii) review project assessments and environmental control proposals;
- (iv) prepare deficiency statements;
- (v) provide conclusions and recommendations on habitat management considerations of the project to the Habitat Policy Steering Committee;
- (vi) prepare draft departmental position statements for transmittal to the Habitat Policy Steering Committee;
- (vii) present information and represent the Department at hearings and inquiries; and
- (viii) carry out follow-up work as required.

Enforcement Policy

1. The Department prefers to prevent damage to habitat and avoid losses to the fisheries resource, rather than to take court action against offenders after the fact. However, when voluntary compliance fails to produce the desired objective, and the *Fisheries Act* is contravened and the habitats supporting fisheries resources are altered, destroyed or degraded, enforcement officers of the Department will carry out enforcement action.
2. Except in emergency situations where immediate, on-the-spot action is required, enforcement officers will, in the interest of fair treatment, make every reasonable effort to consult with the person or persons involved including other regulatory agencies, before enforcement action is taken, in order to obtain as much information as possible about the incident.
3. The Governor-in-Council may make formal orders under Section 33.1(2) to modify, restrict or close works or undertakings. Before recommending such action, however, the Minister of Fisheries and Oceans shall offer to consult with his colleague, the Minister of the Environment, for cases involving deleterious substances, and offer to consult with other federal departments and with the government of any province or territory that may be affected.
4. In critical situations where a violation or potential violation is observed, and the offending party

refuses to discontinue the action causing the violation, the operating equipment may be seized, pursuant to Section 58 of the *Act*.

5. Officials of the Department will investigate fish kills, frequently in collaboration with officials of Environment agencies, and, where possible, ensure that action is taken to initiate mitigative measures and to eliminate the source of the problem. Alleged violators of the *Act* will be prosecuted when the evidence warrants.
6. Pursuant to the Memorandum of Understanding between Fisheries and Oceans and Environment Canada on Section 33 of the *Act* regional working agreements between the two Departments will provide for coordinated enforcement of Section 33 violations.
7. In the event that discharges of deleterious substances are detected that present an immediate threat to fisheries, and no other government agency has initiated action, officials of Fisheries and Oceans will intervene directly by contacting the proponent and immediately advising appropriate regulatory agencies on required actions. Where necessary, the prohibition powers of Section 33 will be used to stop the discharge as quickly as possible and to arrange for clean-up, if feasible. The Department will proceed with legal charges if the evidence warrants.
8. In situations where the Department becomes aware of a violation or potential violation that presents irreparable harm to fisheries resources, a court injunction may be requested under Section 31(4) and 33(9) to halt the work or undertaking.
9. Private citizens may initiate prosecutions under the habitat provisions of the *Act*. The Department will examine the circumstances surrounding each litigation and make recommendations to the Department of Justice concerning the public interest and the technical relevance of the case to the habitat provisions of the *Act*.
10. In cases where the courts have ruled a defendant guilty and where the damage to fish habitat can be corrected or remedied, officials of the Department or the Crown prosecutor may speak to sentence, urging the court to order restorative action.

Training and Guidelines

1. Technical and resource management training programs are provided for enforcement officers whose responsibilities include habitat management. Professional and technical habitat staff of the Depart-



ment will continue to be offered training in subjects such as habitat evaluation procedures, **no net loss** procedures, and integrated resource planning, including instruction on the activities of other resource industries such as forestry and mining.

2. As part of its implementation of this policy, Fisheries and Oceans will expand the preparation and publication of guidelines, in an effort to improve the Department's ability to administer the habitat provisions of the *Fisheries Act*, and to provide for consistent national application. Guidelines are currently available in some regions of Canada for subjects such as road construction, dredging and forestry. National guidelines exist for various regulations under Section 33 of the *Act*, including pulp and paper, oil refining, metal mining and food processing. The following additional national guidelines are under consideration:

1. A Guide to Achieving **no net loss**.
2. Assessment Procedures for Evaluating Fish Habitat.
3. Restoration and Development Guidelines.
4. Integrated Habitat Management Planning.

4.2 Second Strategy

INTEGRATED RESOURCE PLANNING

Participate in and encourage resource planning and management to incorporate fish habitat priorities into air, land and water use plans.

Interpretation:

1. Where it is responsible for managing the fisheries resource, the Department will seek opportunities to resolve multiple resource use conflicts affecting the fisheries by participating in resource planning and management with provincial, territorial, municipal, other federal government agencies and other resource users (where applicable), and by recognizing the mandate and objectives of all participants.
2. The Department will plan for the conservation, restoration and development of the fisheries resource and its supporting habitat, in support of its fisheries management objectives.
3. The Department is prepared to seek ways to accommodate the concerns of other resource interests,

wherever feasible.

4. The Department is prepared to enter into agreements with provincial, territorial, municipal and other federal agencies to achieve mutually agreeable resource planning and management objectives and to carry out joint programs such as the development of habitat inventories.

4.3 Third Strategy

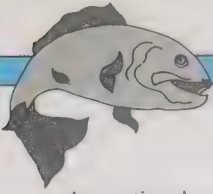
SCIENTIFIC RESEARCH

Conduct scientific research to provide the information and technology necessary for the conservation, restoration and development of fish habitats.

Interpretation:

1. The Department will continue to carry out a broad program of basic scientific research on Canada's fisheries, part of which will be directed toward providing the knowledge, data and information required to:
 - (a) assess the relative importance of specific habitats as a factor contributing to fish production;
 - (b) assess the effects of human-induced chemical, physical and biological changes on fisheries resources and the habitats that support them;
 - (c) determine how adverse effects on fish habitat may be mitigated and establish criteria for





the continued natural production and safe consumption of fish;

- (d) develop and refine techniques to restore degraded and develop new habitats;
 - (e) refine our understanding of the factors that control the productive capacity of natural habitats and how to measure those factors; and
 - (f) develop improved methods of evaluating the economic and social worth of fish habitats.
2. The Department will encourage and participate in cooperative habitat-related research programs with other federal government departments, provincial and territorial agencies, and industry groups and associations to improve knowledge in areas of common interest, such as instream flow requirements, fish passage problems, chemical or biological contamination problems, forestry and energy developments.
 3. The Department will continue to participate in and cooperate with international scientific organizations whose mandate relates to fisheries and the aquatic environment.
 4. Habitat-related research priorities of the Department will be established through consultative arrangements with fishery managers, habitat managers, and where appropriate, industrial interests, government agencies, and the general public.
 5. The Department's habitat-related research findings will be made public and reported in scientific and technical publications, and through a variety of public forums.

4.4 Fourth Strategy

PUBLIC CONSULTATION

Consult the public on major or controversial fish habitat issues and on the development of new policies and legislation for fish habitat management.

Interpretation:

1. Of the thousands of projects and activities examined by Fisheries and Oceans across Canada each year, few will constitute a sufficiently high risk to fisheries or be of such high public concern as to require any special process for public consultation, other than normal consultation with the proponent and any other interested parties.
2. Where it is determined by the Minister that an issue requires formal public consultation, the Depart-

ment's first preference will be to participate fully in the established review procedures of other federal departments or provincial governments, for example, Environment or Energy agencies, provided the terms of reference for the review are satisfactory to the Minister.

3. In cases where other established public review processes would not normally apply to a project, and the Minister of Fisheries and Oceans determines that one is required for his purposes, he may initiate such a process. For this purpose, the following options will be considered in order of preference (a) joint sponsorship of an independent public review with another Minister, federal or provincial; or (b) a federal independent public review under the *Inquiries Act*.
4. The Minister will consider all views expressed in arriving at a decision.

4.5 Fifth Strategy

PUBLIC INFORMATION AND EDUCATION

Promote public awareness in the conservation, restoration and development of fish habitats.





Interpretation:

1. Strong public sentiment in support of habitat conservation, restoration and development will reduce the likelihood that habitat abuse will occur.
2. The Department will foster increased public awareness of the importance of fish habitat and the threats to it by continuing to publish and distribute balanced and objective information material and technical guidelines; to produce films and other education materials for use by the media and the public, particularly in schools; and to sponsor conferences, seminars, workshops and symposia.
3. The Department will cooperate with private organizations to encourage distribution of interpretive material on fish habitat management and to promote habitat awareness.

4.6. Sixth Strategy

COOPERATIVE ACTION

Encourage and support involvement by government agencies, public interest groups and the private sector to conserve, restore and develop fish habitats.

Interpretation:

1. Community involvement in habitat-related activities will be encouraged so as to instill positive attitudes and local pride in the fisheries resource and

its habitat, and to raise the level of understanding about the complex relationship between the resource and its supporting habitats. Employment and economic benefits can also be realized by involving local communities in habitat-related work.

2. The Department will, through inter-agency cooperative arrangements, participate in project referral systems and in established environmental and energy assessment and review procedures for the evaluation of projects and to support the habitat conservation goal.
3. The implementation of the objective and goals of this policy will be assisted by the development of cooperative arrangements, such as national or regional committees, foundations or boards involving industry, other non-government groups, other government agencies and departmental representatives.
4. The Department will encourage the development of approaches whereby interested companies and associations would use their own staff to protect fish habitat, in accordance with departmental guidelines and fish habitat management plans, and subject to departmental surveillance and audit.

4.7 Seventh Strategy

HABITAT IMPROVEMENT

Initiate projects and provide advice to other interested groups to restore and develop fish habitats, in support of the net gain objective.

Interpretation:

1. Under this strategy, habitats may be restored by rehabilitating streams; by eliminating or controlling exotic species, predators, parasites, and competitors; by removing man-made and storm-related physical barriers and other initiatives; and, in cooperation with Environment Canada, requiring the installation and operation of suitable waste treatment technology.
2. The Department will support habitat restoration and development projects using departmental and other federal government funds, when such funds are available, and where resulting economic and employment benefits can be achieved through the fisheries resource.
3. Where it manages the fisheries directly, the Department will provide advice and guidance to commu-



nity and conservation groups that wish to undertake habitat restoration and development projects; financial support also may be provided, depending on the availability of public funds for this purpose.

4.8 Eighth Strategy

HABITAT MONITORING

Evaluate the effectiveness of decisions taken and techniques used to conserve, restore and develop fish habitats.

Interpretation:

1. Recognizing limitations in the ability to predict changes to fish habitats arising from proposed actions, the Department will rely increasingly on the results of monitoring the effects, both during and, for a prescribed period, after development. In this way the effectiveness of departmentally prescribed conditions of approval, intended to maintain the productive capacity of fish habitats, will be evaluated and new knowledge will be acquired.
2. Proponents may be required to undertake follow-up monitoring studies on the effectiveness of habitat mitigation and compensation prescriptions as a condition of project approval by the Department, and subject to prior discussion and agreement with the proponent on the scope and schedule for monitoring.
3. The results of monitoring studies will be used by the Department as a basis for discussion with proponents, on the possible need for improvements in mitigation and compensation measures, immediately or as soon as practical after the facility or activity commences operations. The Department will identify, as a condition of approval, the possible need for follow-up corrective actions by proponents.
4. Studies designed to detect chemical hazard problems, to determine baseline conditions and the effects of change, and to establish environmental trends, may be undertaken by the Department as part of its in-house programs of scientific research, inventory and other investigations, such as those on the effects of acid rain.
5. The Department will address the problems associated with the chemical contamination of fish habitat and fisheries resources through the examination of inventory information on chemicals in use or proposed for use. Samples of fish, other aquatic biota, water and sediments will be analyzed to determine levels of specific chemicals and their by-products.
6. The Department will carry out project-related evaluations and effects monitoring on a selected basis, in support of the policy goals of habitat conservation, restoration and development.
7. The Department will consult with Environment Canada respecting that agency's compliance monitoring plans.



CHAPTER FIVE

PROCEDURES TO APPLY THE NO NET LOSS PRINCIPLE



The guiding principle of **no net loss** signals a renewed effort by the Department of Fisheries and Oceans to ensure that the social and economic benefits, generated for Canadians by the productive capacity of fish habitats and the fisheries resources they support, are maintained over time. Application of the guiding principle would not mean that all proposed works and undertakings in or near water would have to be stopped, or that unreasonable demands would be imposed on their design, construction and operation. For example, liquid wastes would continue to be discharged into Canada's fisheries waters after suitable treatment to control harmful effects; marinas and port developments would proceed using acceptable locations and designs; and mineral exploitation and many land and water use practices would take place under environmental controls designed to protect fish habitats. As a matter of good practice however, each development, whether major or minor, will be evaluated in the planning phase, using an existing process when possible, to determine if its impact on fish habitat would reduce the capability of that habitat to sustain fisheries resources. Should it be determined that the proposed development would result in a loss of productive fish habitat, the Department would review the measures required to achieve **no net loss**, pursuant to the hierarchy of preferences as follows.

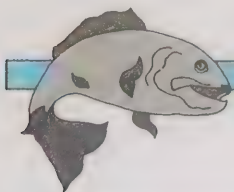
5.1 *Hierarchy of Preferences*

Fisheries management objectives and plans, where available, will be a major consideration for the Department in deciding where to apply this guiding prin-

ciple and what offsetting proposals would be acceptable to achieve **no net loss**. For example, in some circumstances it may be possible for the Department to meet its management objectives by applying the principle on a fish stock-specific basis. The preferences that follow refer to those circumstances. In other cases, such as for the management of species that are resident in lakes, the principle may be applied on the basis of achieving **no net loss** within a geographic area, as described in paragraph five of Section 2.2.1.

When the fishery resource and its supporting habitat are put at risk by a proposed development project or activity, the Department will be guided by the following hierarchy of preferences to achieve **no net loss** of productive capacity.

1. For the application of the **no net loss** principle, the first preference of the Department will be to maintain without disruption the natural productive capacity of the habitat(s) in question by avoiding any loss or harmful alteration at the site of the proposed project or activity. This will be especially important where local communities rely on specific fisheries stocks. It may be achieved by encouraging the proponent to redesign the project, to select an alternate site, or to mitigate potential damages using other reliable techniques, such as by installing adequate pollution control equipment.
2. Only after it proves impossible or impractical to maintain the same level of habitat productive capacity using the approaches outlined above would the Department accede to the exploration of compensatory options. First of all, the possibilities for like-



for-like compensation should be assessed; that is replacing natural habitat at or near the site. Should this not be feasible, then secondly it might be possible to consider either moving off-site with the replacement habitat, or increasing the productivity of existing habitat for the affected stock, if reliable techniques are available. Compensation options will not be possible as a means of dealing with chemical pollution and contamination problems; reliable control techniques must be installed and operated to mitigate such problems from the outset.

3. In those rare cases where it is not technically feasible to avoid potential damage to habitats, or to compensate for the habitat itself, the Department would consider proposals to compensate in the form of artificial production to supplement the fishery resource, provided the following conditions are met:
 - (a) such a solution will be in accordance with the objectives established in the local fisheries management plan, assuming one is available;
 - (b) genetic and other biological factors are satisfied; and,
 - (c) practical and proven techniques are available.
4. The costs associated with providing facilities or undertaking measures to mitigate and compensate for potential damages to the fisheries resource, will be the responsibility of proponents, as will the costs to operate and maintain such facilities.

5.2 Procedural Steps for No Net Loss

To apply the no net loss guiding principle and achieve the habitat conservation goal, the Department will, through inter-agency cooperative arrangements, use established project referral systems and environmental and energy assessment and review procedures, wherever possible. No new regulatory procedures are contemplated by Fisheries and Oceans to implement this principle. The Department will generally conduct its reviews in accordance with the following six steps (Figure 2), recognizing that more time and effort will be required to complete Steps II, III and V for larger projects.

Step I – Notification: Information and requests for departmental approval of works or undertakings in or near the water will come to the attention of the Department in the following ways: (a) through established inter-agency referral systems, (b) inquiries from the proponent, (c) inquiries from concerned citizens, (d) public announcement of the project and (e) in response to requests from the Department of Fisheries and Oceans

to proponents for information about their projects. The majority of notifications come to the Department's attention through inter-agency referral mechanisms. These mechanisms have proved to be very effective in the past and the Department intends to continue using them.

Step II – Examination: Once information on a proposal is received, the Department undertakes a detailed examination of the potential implications of the work or undertaking to the fisheries resource. For chemical hazards, information is needed on the physico-chemical properties of the suspect chemical and its by-products, its toxicity and pathology to fish, and the routes and rates of entry into the natural environment. For minor projects involving physical activities (e.g., salmon stream crossings) which disrupt important fish habitat, Fishery Officers and fish habitat management staff will assist operators to the extent feasible in identifying the biological impacts of the work or undertaking and will make a biological assessment of the requirements necessary to meet fisheries operational objectives. For major projects, obtaining and presenting relevant information on the project or the chemical compounds involved, and on the fish habitat that is likely to be affected, is the responsibility of the proponent under Section 33.1(1) of the *Act*. This step will take varying amounts of time to complete, depending on the size of the project, and it will be in the interest of proponents to provide assessments on a timely basis. Staff of the Department will assess the information obtained and if necessary visit the site and undertake studies to complete their assessments.

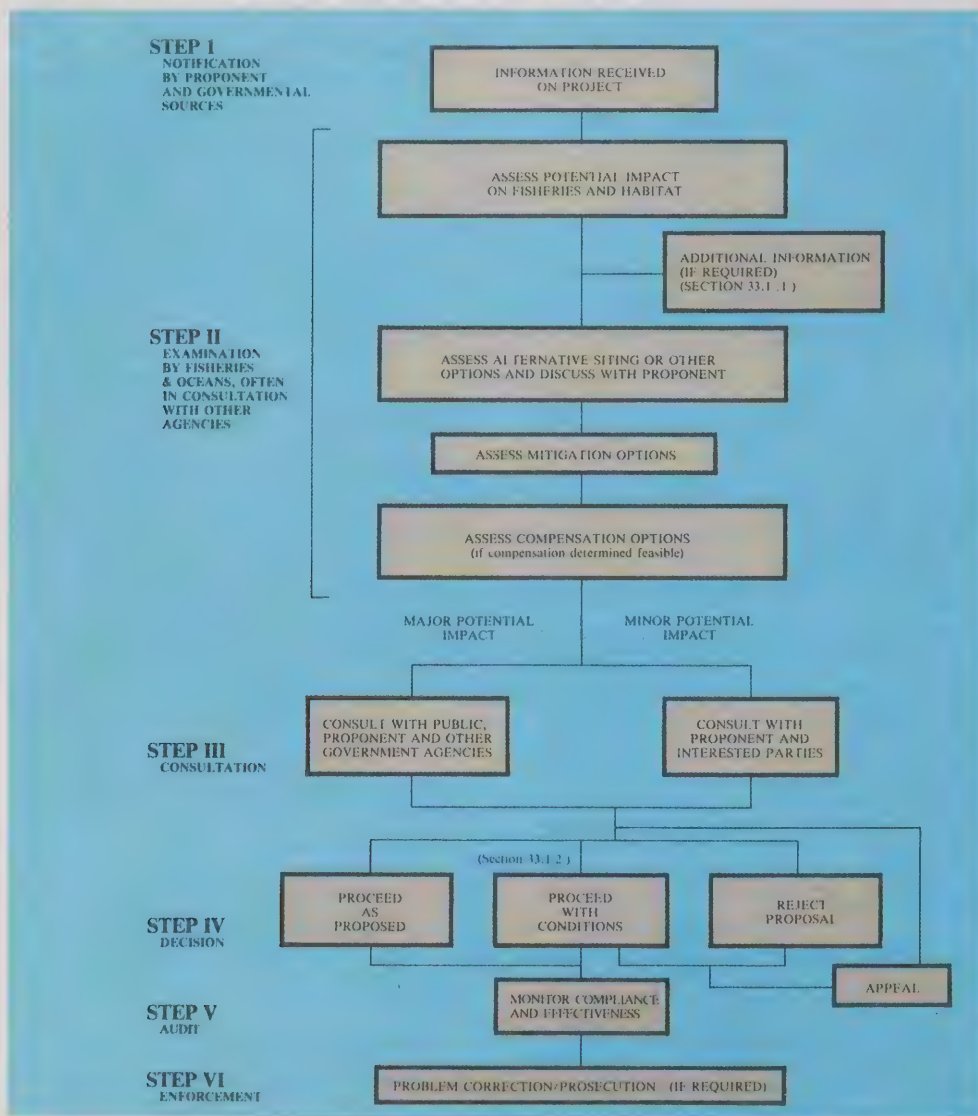
As part of the examination step, the hierarchy of preferences (outlined earlier in this chapter) will be used to guide both the Department and proponents; the amount of detail and time required will depend again on the size of the work or undertaking, and its potential impact on fish habitats.

Step III – Public Consultation: The Department recognizes the need to provide opportunities for public review and input to decisions on developments that have broad social, economic or environmental implications. More information on the Department's approach to public consultation may be found in section 4.4 of this policy.

In the case of major development projects, where avoidance of habitat loss or damage is not feasible, and where mitigation and compensation measures cannot be implemented to fully avoid losses to the productive capacity of habitats, and particularly where special regulations to allow the project to proceed are contemplated



FIGURE 2 PROCEDURAL STEPS TO ACHIEVE NO NET LOSS





under the *Fisheries Act*, no decision to proceed with the project in question will be taken by the Minister of Fisheries and Oceans without public consultation and a thorough review and assessment of all factors.

Step IV – Decision: Following its examination of the proposed work or undertaking and the results of any public consultation, the Department will decide whether the project is likely to result in a net loss of productive habitat capacity. If a loss is likely, the Department will then have to decide if the proponent's plans to mitigate and compensate are acceptable. In cases involving chemical hazards, adverse effects must be controlled by mitigation measures to avoid potential damage to the productive capacity of fish habitats. For those cases, compensation in-kind is not an acceptable option.

The Department will give due consideration to the economic benefits and costs associated with the development of alternative solutions to achieve **no net loss** of productive capacity.

Depending on the outcome of the Department's deliberations, it could decide directly, or through a recommendation to the Minister in cases involving major development projects; as follows:

- i) to permit the proposal to proceed as proposed (no harm expected to the productive capacity of fish habitat);
- ii) to permit the proposal to proceed with fixed conditions (often with respect to schedule, methods, equipment, environmental control and mitigation measures, compensation, follow-up monitoring, possible need for corrective adjustments by proponent after start-up, the training of company personnel, and other conditions); or
- iii) to reject the proposal (potential losses to the fisheries judged unacceptable).

Any changes to the original conditions of approval will be negotiated between the Department and the proponent.

In cases where the Department has to advise a proponent that the work or undertaking is unacceptable, the Department will present information to support the following conclusions:

- i) that despite the best efforts to control adverse effects, unacceptable net loss of habitat will take place if the project proceeds;
- ii) that this potential loss of habitat will cause demonstrable harm to fisheries resources; or
- iii) that there is an unacceptable level of uncertainty involved in forecasting the potential effects on fish habitats and the fisheries resources.

Appeals:

- (1) Should any person feel aggrieved by a habitat-related decision made by departmental staff, that person may at any time request a review of the decision by senior management levels within the Department, including Regional Directors-General, the Deputy Minister or by the Minister of Fisheries and Oceans.
- (2) Should any proponent or interested party feel aggrieved by the decision-making process an appeal may be made to senior management levels within the Department or to the Minister.
- (3) In the event of an unresolved dispute regarding a major development project, the Minister may agree to refer the project to an independent body or panel for study and recommendations.

Step V – Audit: As explained in section 4.7 of this policy, the Department will ensure that compliance monitoring and effectiveness evaluation are undertaken.

Step VI – Enforcement: The Department will enforce the legislation for which the Minister of Fisheries and Oceans is accountable, using trained personnel, as explained in section 4.1.



ANNEX

THE LEGISLATIVE MANDATE

Under the *Constitution Act* (1982), the federal government has legislative responsibility for Canada's fisheries. The Minister of Fisheries and Oceans has been assigned responsibility for sea coast and inland fisheries, marine science and administration of the *Fisheries Act*. A key component of the Minister's overall responsibility for fisheries management is the protection of fish and fish habitat from disruptive and destructive activities. Fisheries and oceanographic research provide, among their outputs, the knowledge required for sound fish habitat management.

The habitat protection provisions of the *Fisheries Act* provide the Minister of Fisheries and Oceans with the following powers (see the departmental publication of "Canada's Fish Habitat Law" for more information):

- Section 20:** The authority to require the construction, maintenance and operation of fish passage facilities at obstructions in rivers; to require financial support for fish hatchery establishments constructed and operated to maintain runs of migratory fish; to remove unused obstructions to fish passage; and to require a sufficient flow of water at all times below an obstruction for the safety of fish and the flooding of spawning grounds.
- Section 28:** The authority to require the installation and maintenance of screens or guards to prevent the passage of fish into water intakes, ditches, canals and channels.
- Section 30:** The authority to prohibit the destruction of fish by any means other than fishing.
- Section 31:** The authority to modify, restrict or prohibit any work or undertaking which is likely to result in the harmful alteration, disruption or destruction of fish habitat, a term that is defined in subsection 31(5) of the *Act*.
- Section 33:** Comprehensive powers to protect fish and fish habitat from the discharge of deleterious substances; to request plans for developments that may affect fish; to develop regulations and to modify, restrict or prohibit certain works or undertakings.

Other Sections: Definitions, penalties and additional powers are provided in Sections 31(3), 33.1(9), 33.4(1), 34, 52, 53, 55 and 56, among others.

Fishery Regulations specific to provinces and territories are made pursuant to the *Fisheries Act*, and some of these contain habitat protection sections. The Department is also responsible for administration of the *Great Lakes Fisheries Convention Act*, which provides for Canada-U.S. rehabilitation of the Great Lakes.

GLOSSARY

Canadian Fisheries Waters "All waters in the fishing zones of Canada, all waters in the territorial sea of Canada and all internal waters of Canada." (*Fisheries Act*, sec. 2)

Compensation for Loss The replacement of natural habitat, increase in the productivity of existing habitat, or maintenance of fish production by artificial means in circumstances dictated by social and economic conditions, where mitigation techniques and other measures are not adequate to maintain habitats for Canada's fisheries resources.

Conservation (of habitats) The planned management of human activities that might affect fish habitats to prevent destruction and subsequent loss of fisheries benefits.

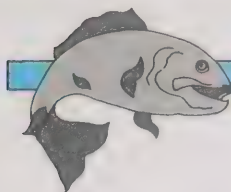
Development (of habitats) The creation of fish habitat and the enhancement or other improvement (such as flow regulation, nutrient modification, provision of access to spawning and rearing areas, etc.) applied to any type of fish habitat to provide better conditions for production and maintenance of the fisheries resource.

Fish "includes shellfish, crustaceans, marine animals, marine plants and the eggs, spawn, spat and juvenile stages of fish, shellfish, crustaceans and marine animals." (*Fisheries Act*, sec. 2).

Fish Habitats "Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes." (*Fisheries Act*, sec. 31.5).

Fish Habitat Management Program Those activities, legislative responsibilities and policies administered by the Department of Fisheries and Oceans for the purpose of conserving, restoring and developing the productive capacity of habitats for the fisheries resources.

Fish Habitat Management Plan A plan prepared for a region or a specific geographic area of a region



which includes an outline of the Department's requirements for conserving, restoring and developing fish habitat to meet fisheries production objectives and for use as the basis for consultation in integrated resource planning.

Fisheries Resources Fish stocks or populations that sustain commercial, recreational or native fishing activities of benefit to Canadians.

Integrated Resource Planning The process whereby federal, provincial, territorial and municipal resource management agencies consult each other and private sector interests to plan for the future use of natural resources including forests, minerals, fish, land, water, wildlife and other resources.

Major Projects Those works, undertakings and activities that could potentially have, or be perceived to have, significant negative impacts on the habitats supporting Canada's important fisheries resources. Examples include: large-scale aerial biocide spraying of forest and agricultural lands; deep-draft marine terminals; hydroelectric dams and diversions; integrated mining operations; offshore oil and gas exploration and development; large industrial and municipal waste discharges; large pipelines, rail lines, roads and transmission lines; large forest harvesting operations; large dredging operations; and other similar projects.

Minor Projects Those works, undertakings and activities which would not normally have, or be perceived to have, serious irreversible biological effects that could not be mitigated, on the habitats supporting Canada's fisheries resources. Examples include:

most stream crossings, culvert installations, and other stream alterations; most wharf and breakwater construction and repairs; most individual forest harvesting operations; small dredging projects; small foreshore modifications; and other similar projects.

Mitigation Actions taken during the planning, design, construction and operation of works and undertakings to alleviate potential adverse effects on the productive capacity of fish habitats.

Net Gain An increase in the productive capacity of habitats for selected fisheries brought about by determined government and public efforts to conserve, restore and develop habitats.

No Net Loss A working principle by which the department strives to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss or damage may be prevented.

Productive capacity The maximum natural capability of habitats to produce healthy fish, safe for human consumption, or to support or produce aquatic organisms upon which fish depend.

Protection (of habitats) Prescribing guidelines and conditions, and enforcing laws for the purpose of preventing the harmful alteration, destruction or disruption of fish habitat.

Restoration (of habitats) The treatment or clean-up of fish habitat that has been altered, disrupted or degraded for the purpose of increasing its capability to sustain a productive fisheries resource.

Appendix D • List of Technical Reports

- 1 Infectious Diseases and Potential Impacts on Survival of Fraser River Sockeye Salmon
- 1A Assessment of the Potential Effects of Diseases Present in Salmonid Enhancement Facilities on Fraser River Sockeye Salmon
- 2 Potential Effects of Contaminants on Fraser River Sockeye Salmon
- 3 Evaluating the Status of Fraser River Sockeye Salmon and Role of Freshwater Ecology in Their Decline
- 4 The Decline of Fraser River Sockeye Salmon *Oncorhynchus nerka* (Steller, 1743) in Relation to Marine Ecology
- 5A Summary of Information for Evaluating Impacts of Salmon Farms on Survival of Fraser River Sockeye Salmon
- 5B Examination of Relationships between Salmon Aquaculture and Sockeye Salmon Population Dynamics
- 5C Impacts of Salmon Farms on Fraser River Sockeye Salmon: Results of the Noakes Investigation
- 5D Impacts of Salmon Farms on Fraser River Sockeye Salmon: Results of the Dill Investigation
- 6 Fraser River Sockeye Salmon: Data Synthesis and Cumulative Impacts; and
- 6A Addendum to Technical Report 6: Implications of Technical Reports on Salmon Farms and Hatchery Diseases for Technical Report 6 (Data Synthesis and Cumulative Impacts)
- 7 Fraser River Sockeye Fisheries and Fisheries Management and Comparison with Bristol Bay Sockeye Fisheries
- 8 Predation on Fraser River Sockeye Salmon
- 9 A Review of Potential Climate Change Effects on Survival of Fraser River Sockeye Salmon and an Analysis of Interannual Trends in En Route Loss and Pre-spawn Mortality
- 10 Fraser River Sockeye Production Dynamics
- 11 Status of DFO Management and Science*
- 12 Fraser River Sockeye Habitat Use in the Lower Fraser and Strait of Georgia

* Report 11 was not entered as an exhibit.

Appendix E • List of Policy and Practice Reports

- 1 The Aboriginal and Treaty Rights Framework Underlying the Fraser River Sockeye Salmon Fishery
- 2 International Law Relevant to the Conservation and Management of Fraser River Sockeye Salmon
- 3 Legislative Framework Overview
- 4 Pacific Salmon Treaty and the Pacific Salmon Commission Regarding Management of Fraser River Sockeye Salmon
- 5 Overview of Fraser River Sockeye Salmon Harvest Management
- 6 Commercial Salmon Fishing: Licensing, Allocation, and Related Issues
- 7 Recreational Salmon Fishing: Licensing, Management, and Related Issues
- 8 The Department of Fisheries and Oceans' Habitat Management Policies and Practices
- 9 Enforcement of the Habitat Protection and Pollution Prevention Provisions of the *Fisheries Act*
- 10 Overview of Fraser River Sockeye Salmon Net and Gross Escapement Data
- 11 Overview of Habitat Enhancement and Restoration
- 12 Fishery Monitoring and Catch Reporting for Commercial and Aboriginal Fraser River Sockeye Salmon Fisheries
- 13 Department of Fisheries and Oceans Policies and Programs for Fisheries Enforcement
- 14 Overview of Freshwater Urbanization Impacts and Management
- 15 Municipal Wastewater, Pulp and Paper and Mining Effluents
- 16 Gravel Removal in the Lower Fraser River
- 17 Regulation of Forestry Activities Impacting Fraser River Sockeye Habitat
- 18 Department of Fisheries and Oceans Policies and Programs for Aboriginal Fishing
- 19 Overview of Marine Environment Issues Potentially Relevant to Fraser Sockeye Salmon
- 20 Aquaculture Regulation in British Columbia
- 21 Regulation of Water Uses in the Fraser River Watershed

Abbreviations and acronyms

AAA	Aboriginal Aquaculture Association	AVC	Atlantic Veterinary College
AAROM	Aboriginal Aquatic Resource and Oceans Management	BAMP	Broughton Archipelago Monitoring Program
ACFLR	<i>Aboriginal Communal Fishing Licences Regulations</i>	BC	British Columbia
ACRDP	Aquaculture Collaborative Research and Development Program	BC Lab	Animal Health Centre, Abbotsford, BC
ADM	assistant deputy minister	BCSFA	B.C. Salmon Farmers Association
AEO	Aquaculture Environmental Operations (DFO)	BKD	bacterial kidney disease
AFE	Aboriginal Fisheries Exemption	C&E	Compliance and Enforcement
AFS	Aboriginal Fisheries Strategy	C&P	Conservation and Protection Directorate (DFO)
AHC	Area Harvest Committee	CAAR	Coastal Alliance for Aquaculture Reform
AICFI	Atlantic Integrated Commercial Fisheries Initiative	CAIA	Canadian Aquaculture Industry Alliance
AIMAP	Aquaculture Innovation and Market Access Program	Caligus	<i>Caligus clemensi</i> (the herring louse)
AMD	Aquaculture Management Directorate (DFO)	CCME	Canadian Council of Ministers of the Environment
ARIMS	Aquaculture Resource Information Management System	CEAA	<i>Canadian Environmental Assessment Act</i>
ASWP	Atlantic Salmon Watch Program	CEDP	Community Economic Development Program
ATK	Aboriginal traditional knowledge	CEPA	<i>Canadian Environmental Protection Act</i>
ATP	Allocation Transfer Program	CESD	Commissioner of the Environment and Sustainable Development
		CFAR	Canadian Fisheries Adjustment and Restructuring

CFIA	Canadian Food Inspection Agency	FAWCR	<i>BC Finfish Aquaculture Waste Control Regulation</i>
COSEWIC	Committee on the Status of Endangered Wildlife in Canada	FEATS	Fisheries Enforcement Activity Tracking System
CPUE	catch per unit effort	FFSBC	Freshwater Fisheries Society of BC
CREST	catch and release estimation tool	FHASP	BC Fish Health Audit and Surveillance Program
CSA	<i>Canada Shipping Act</i>	FHE	fish health event
CSAB	Commercial Salmon Advisory Board	FHMP	Fish Health Management Plan
CSAP	Centre for Science Advice (Pacific)	FHPR	<i>Fish Health Protection Regulations</i>
CSAS	Canadian Science Advisory Secretariat	FHV	fish health veterinarian
CSO	combined sewer overflow	FM&CR	fisheries monitoring and catch reporting
CTAC	Canadian total allowable catch	FN	First Nations
CU	Conservation Unit	FNC	First Nations Coalition
CWL	Commonwealth Legal	FNFC	First Nations Fisheries Council
DBEs	differences between in-season and post-season estimates of escapement	FPA	<i>BC Fish Protection Act</i>
DDT	dichlorodiphenyltrichloroethane	FPCA	<i>Forest Practices Code of British Columbia Act</i>
DEPOMOD	depositional modelling	FPPR	<i>Forest Planning and Practices Regulation</i>
DFO	Department of Fisheries and Oceans	FRAFS	Fraser River Aboriginal Fisheries Secretariat
DIDSON	Dual-Frequency Identification SONAR	FREP	Forest and Range Evaluation Program
DMC	Departmental Management Committee (DFO)	FRIMT	Fraser River Sockeye and Pink Salmon Integrated Management Team
DND	Department of National Defence	FRP	Fraser River Panel
DOE	Department of the Environment (Environment Canada)	FRPA	<i>BC Forest and Range Practices Act</i>
DOJ	Department of Justice Canada	FRSSI	Fraser River Sockeye Spawning Initiative
Draft RMAF	Wild Salmon Policy Implementation Workplan – Results-based Management and Accountability Framework	FSC	food, social, and ceremonial
DVS	Departmental Violation System	FSWP	Fraser River Salmon and Watersheds Program
EAA	<i>BC Environmental Assessment Act</i>	FTE	full-time equivalent
EED	Environmental Enforcement Directorate	FVAFS	Fraser Valley Aboriginal Fisheries Society
EEM	environmental effects monitoring	GB	gigabyte
eLog	electronic logbook	GDP	gross domestic product
EMA	<i>BC Environmental Management Act</i>	GFC	Gulf Fisheries Centre
ENGO	environmental non-governmental organization	HAB	harmful algal bloom
EPMP	Environmental Process Modernization Plan	HADD	harmful alteration, disruption or destruction of habitat (<i>Fisheries Act</i> , s. 35)
ESSR	excess salmon to spawning requirements	HAMP	Harmful Algae Monitoring Program
ESSRF	Environmental Science Strategic Research Fund	HWG	Habitat Working Group
EWatch	Environmental Watch Program (DFO)	HMU	Habitat Monitoring Unit
FAM	Fisheries and Aquaculture Management	HSMI	heart and skeletal muscle inflammation
FAO	Food and Agriculture Organization of the United Nations	IAPF	Integrated Aboriginal Policy Framework

IFMP	Integrated Fisheries Management Plan	NGO	non-governmental organization
IHN	infectious hematopoietic necrosis	NHQ	national headquarters
IHNv	infectious hematopoietic necrosis virus	NNFC	Northern Native Fishing Corporation
IHPC	Integrated Harvest Planning Committee	NOAA	US National Oceanic and Atmospheric Administration
IMAP	Integrated Management of Aquaculture Plan	NPAFC	North Pacific Anadromous Fish Commission
IPCC	Intergovernmental Panel on Climate Change	NPRI	National Pollutant Release Inventory
IPMA	BC <i>Integrated Pest Management Act</i>	NSERC	National Sciences and Engineering Council of Canada
IPN	infectious pancreatic necrosis	NWPA	<i>Navigable Waters Protection Act</i>
IPNv	infectious pancreatic necrosis virus	OHEB	Oceans, Habitat and Enhancement Branch (DFO)
IPP	independent power project	OIE	World Organisation for Animal Health
IPSFC	International Pacific Salmon Fisheries Commission	ONA	Okanagan Nation Alliance
IQ	individual quota	PA	precautionary approach
ISA	infectious salmon anemia	PacFish	Pacific Fisheries Data Initiative
ISAv	infectious salmon anemia virus	PAH	polycyclic aromatic hydrocarbon
ISDF	Integrated Salmon Dialogue Forum	PAR	<i>Pacific Aquaculture Regulations</i>
ITQ	individual transferable quota	PARP	Pacific Aquaculture Regulatory Program
JTG	joint task group (report of Pearse and McRae)	PARR	Program for Aquaculture Regulatory Research
Leps	<i>Lepeophtheirus salmonis</i> (the salmon louse)	PATH	Program Activity Tracking for Habitat database
LKTS	Lach-Kwil-Tach Treaty Society	PBDE	polybrominated diphenyl ether
LRP	limit reference point	PBS	Pacific Biological Station (DFO), Nanaimo
M&C Panel	Monitoring and Compliance Panel	PBT	persistent, bioaccumulative, and toxic
MA	management adjustment	PCB	polychlorinated biphenyl
MAL	BC Ministry of Agriculture and Lands	PCO	Privy Council Office
MARPAC	Maritime Forces Pacific (DND)	PCPA	<i>Pest Control Products Act</i> (federal)
MFLNRO	BC Ministry of Forests, Lands and Natural Resource Operations	PCR	polymerase chain reaction
MMER	<i>Metal Mining Effluent Regulations</i>	PDO	Pacific decadal oscillation
MOE	BC Ministry of Environment	PFAR	Pacific Fisheries Adjustment and Restructuring Program
MOU	memorandum of understanding	PFRCC	Pacific Fisheries Resource Conservation Council
MPB	mountain pine beetle	PICES	North Pacific Marine Science Organization
MPIRS	Marine Pollution Incident Reporting System	PICFI	Pacific Integrated Commercial Fisheries Initiative
MRS	mortality-related signature	PIP	Public Involvement Projects
MSC	Marine Stewardship Council	PMRA	Pest Management Regulatory Agency (Health Canada)
MSY	maximum sustainable yield	PNCIMA	Pacific North Coast Integrated Management Area
NAAHLS	National Aquatic Animal Health Laboratory System	PPER	<i>Pulp and Paper Effluent Regulations</i>
NAAHP	National Aquatic Animal Health Program	PPM	pulp and paper mill
NEMISIS	National Emergencies and Enforcement Management Information System and Intelligence System	PPR	Policy and Practice Report

Pre-amp	pre-amplification step (used in RT-PCR)	SCORE	Sub-Committee on Options for Review and Evaluation (CSAB)
PSAC	Public Service Alliance of Canada	SDC	Strategic Directions Committee
PSARC	Pacific Scientific Advice Review Committee	SEP	Salmonid Enhancement Program
PSC	Pacific Salmon Commission	SFAB	Sport Fishing Advisory Board
PWGSC	Public Works and Government Services Canada	SFC	Secwepemc Fisheries Commission
Q and A	questions and answers	SFF	Sustainable Fisheries Framework
QEP	qualified environmental professional	SFU	Simon Fraser University, Burnaby, BC
qRT-PCR	quantitative reverse transcriptase polymerase chain reaction	SLICE	trade name of in-feed therapeutant used to treat fish for sea lice; with active ingredient emamectin benzoate
R/EFS	recruits per effective female spawners	SLIPP	Shuswap Lake Integrated Planning Process
R/smolt	recruits per smolt	SOP	standard operating procedures
RACO	Regional Aquaculture Coordination Office	SST	sea surface temperature
RAR	BC <i>Riparian Areas Regulation</i>	TAC	total allowable catch
RAS	Recirculating Aquaculture System	TAM	total allowable mortality
RDG	regional director general	TAPGD	Treaty and Aboriginal Policy and Governance Directorate
REET	Regional Environmental Emergency Team	TEK	traditional ecological knowledge
RIAS	regulatory impact analysis statement	TR	Technical Report
RISS	Regulatory Information Submission System	TRP	target reference point
RMA	Riparian Management Area	UBC	University of British Columbia, Vancouver
RMAF	Results-based Management and Accountability Framework	UBCM	Union of BC Municipalities
RMC	Regional Management Committee	UEWBC	Union of Environment Workers British Columbia
RSSEPS	Rivers and Smith Salmon Ecosystems Planning Society	UFAWU	United Fishermen & Allied Workers Union
RT	reverse transcriptase	UFFCA	Upper Fraser Fisheries Conservation Alliance
RT-PCR	reverse transcriptase polymerase chain reaction	UN	United Nations
RWA	Regional Working Agreement	UNCLOS	<i>United Nations Convention on the Law of the Sea</i>
S-R	stock-recruitment	UNFSA	United Nations Fish Stock Agreement (also UNFA)
SAFE	Salmon and Freshwater Ecosystems Division of DFO Science	USTAC	US total allowable catch
SAFF	Sustainable Aquaculture Fisheries Framework	VEC	valued ecosystem components
SAP	Sustainable Aquaculture Program (2008)	VHS	viral hemorrhagic septicemia
SAR	1997 Salmon Aquaculture Review (by BC Environmental Assessment Office)	VPN	virtual private network
SARA	<i>Species at Risk Act</i>	VSCs	Valued Social Components
SARCEP	Species at Risk Coordination / Espèces en péril	WCCSFN	Western Central Coast Salish First Nations
SBM	share-based management	WSER	Wastewater Systems Effluent Regulations
		WSP	Wild Salmon Policy
		WUP	Water Use Plan

Glossary

Cross-references are given in italic type.

abundance: the number of fish; the size of the stock.¹

Aboriginal fishery guardian: fishery guardians employed by First Nations who engage in enforcement activities in accordance with Aboriginal fishing agreements.²

acute: in reference to infections, marked by a sudden onset of detectable symptoms that are usually followed by complete or apparent recovery.³

adult: *mature* (includes life stages 4 and 5). See *life cycle*.

aerobic scope: level of oxygen available for activities between basal (resting) and maximal metabolic rates; a characteristic describing the fish's ability to allocate energy to essential tissues.⁴

age class: *ecotype* designation based on the number of winters in freshwater after hatching and the number of winters in saltwater.⁵

alevin: sockeye *life stage* that occurs just after hatching from the egg, with *yolk sac* still present; alevins live in gravel until they emerge as *fry*.⁶

amphipod: group of small, mostly planktonic crustaceans belonging to the order Amphipoda.⁷

anadromous: fish that spend most of the growing phase of their *life cycle* in the sea, but return to freshwater to breed.⁸

anthropogenic: caused by humans.

aquaculture: farming of aquatic organisms in the marine environment or freshwater;⁹ unless otherwise stated, in this Report the term "aquaculture" refers specifically to marine salmon aquaculture, or "salmon farms."

Atlantic salmon: species of salmon originating from the northern Atlantic Ocean; commonly used in *aquaculture*.¹⁰

back eddies: places where water flows past an obstacle, which can create a reverse current or cause the water to move in an otherwise different direction or at a different speed.¹¹

benthic areas: areas of the seafloor.¹²

bioassay: controlled experiment for the quantitative estimation of a substance by measuring its effect in a living organism.¹³

biodiversity: full range of variety and variability within and among living organisms and the ecological complexes in which they occur; encompasses diversity at the *ecosystem*, community, species, and genetic levels as well as in the interaction of these components.¹⁴

biota: all the organisms living in a particular region, including plants, animals, and micro-organisms.¹⁵

bloodwater: wastewater from facilities where fish are processed.¹⁶

brailing: using a long-handled “net” scoop to take fish out of the *seine* net.

brood year: year when salmon eggs are laid.¹⁷

brood-year returns: See *total returns*.

bycatch: refers to non-target species (e.g., sockeye salmon when fishing for pink salmon) that become entangled or caught in fishing gear.¹⁸

caligid copepod: parasitic *copepod* crustacean of the family Caligidae.¹⁹

caudal: pertaining to the tail or tail region.²⁰

chlorophyll bloom: areas in the ocean with high, sustained chlorophyll- α values in the surface waters.²¹

chronic: *disease* that may persist for many months or years and may not directly kill the host.²²

ciliate: single-celled organism that uses a number of short cell appendages for locomotion.²³

closed containment facility: facilities that use a range of technologies which attempt to restrict and control interactions between farmed fish and the external aquatic environment, with the goal of minimizing impact and creating greater control over factors in *aquaculture* production.²⁴

compass orientation: ability to move in a fixed direction without reference to local landmarks.²⁵

conservation: protection, maintenance, and rehabilitation of genetic diversity, species, and *ecosystems* to sustain *biodiversity* and the continuance of evolutionary and natural production processes.²⁶

conservation (of habitats): planned management of human activities that might affect fish habitats in order to prevent destruction and the subsequent loss of fisheries.²⁷

Conservation Unit: group of *wild salmon* sufficiently isolated from other groups that, if *extirpated*, is very unlikely to recolonize naturally within an acceptable time frame.²⁸

continental shelf: gently sloping offshore zone that usually extends to approximately 200 m in depth.²⁹

copepods: small marine and freshwater crustaceans of the subclass Copepoda; sea lice are parasitic members of this group.³⁰

counting fences: high-precision method for fish enumeration used at spawning channels and at some rivers and lakes; fish are counted as they pass the fence.³¹

cyclic dominance: pattern of persistent large *abundance* every four years, followed by a slightly smaller subdominant year, with two extremely low abundances in off-cycle years.³²

degree days: measurement of thermal exposure; accumulated degree days are calculated by multiplying the number of days that a fish is exposed to water of a certain temperature.³³

density dependence: feedback mechanism whereby a large *escapement* is thought to create a negative effect on productivity such that subsequent *total returns* of adults could be reduced³⁴ (simple density dependence and delayed density dependence are described in Volume 2 of this Report).

diatoms: single-cellular algae in the phylum Bacillariophyta that are capable of forming filamentous colonies.³⁵

DIDSON: Dual-frequency IDentification SONar, which provides high-definition sonar images.³⁶

dip net: fishing technique used in the Fraser River canyon to catch large numbers of chinook and sockeye salmon; while standing above the current in the river narrows, the fisher dips a large net attached to the end of a pole into the water, traps fish inside, and hauls them out.³⁷

disease: a host fish is diseased if it is behaviourally or physiologically compromised.³⁸

diversion rate: percentage of returning sockeye approaching the Fraser River via the north coast of Vancouver Island and Johnstone Strait (also called the northern diversion rate).³⁹

dual fishing: fishing for two purposes at the same time; for example, fishing commercially and also retaining fish for *food, social, and ceremonial* purposes.⁴⁰

Early Stuart run: one of the four *run-timing groups* of Fraser River sockeye; this stock group spawns in the Takla-Trembleur Lake system and arrives in the Lower Fraser River from late June to late July.⁴¹

Early summer run: one of the four *run-timing groups* of Fraser River sockeye; this stock group spawns throughout the Fraser system and arrives in the Lower Fraser River from mid-July to mid-August; this run includes Bowron, Fennell, Gates, Nadina, Pitt, Raft, Scotch, Seymour, and Early Summer Miscellaneous (Early Shuswap, South Thompson, North Thompson tributaries, North Thompson River, Nahatlach River and Lake, Chilliwack Lake, and Dolly Varden Creek).⁴²

economic opportunity fishery: separates commercial fishing allocations from allocations for *food, social, and ceremonial* purposes for First Nations.⁴³

ecosystem: community of organisms and their physical environment interacting as an ecological unit.⁴⁴

ecosystem approach: approach to the management of human activity that considers all the components of an *ecosystem* that may be affected by the activity, including populations, communities, and habitat, and their linkages, as well as the impact of the ecosystem on the state of the living resource.⁴⁵

ecotype: distinguishes individuals that spend varying numbers of years in freshwater and in saltwater.⁴⁶

effective female spawner: estimate of female spawner *abundance*, which is further adjusted downward by the

proportion of eggs that were not spawned, as determined by sampling on the spawning grounds.⁴⁷

El Niño Southern Oscillation: inter-annual climate variability event that occurs every two to seven years and persists up to 1.5 years, characterized by coupled variations in sea surface temperature and sea level pressure in the tropical Pacific Ocean.⁴⁸

emergence: developmental stage where *juvenile* salmon emerge from their gravel nest.⁴⁹

en route loss (en route mortality): estimate of the number of upstream-migrating adults that die in the river en route to their spawning grounds.⁵⁰

endemic: referring to a pathogen or disease that is constantly present in low numbers in a *population*.⁵¹

enhancement: application of biological and technical knowledge and capabilities to increase the productivity of fish stocks; this increase may be achieved by altering habitat attributes (e.g., habitat restoration) or by using fish culture techniques (e.g., hatcheries, spawning channels).⁵²

enterococci: genus of lactic acid bacteria commonly found in the gastrointestinal tract of fish.

epilimnion: warm upper layer of water in a lake.⁵³

escapement: number of *mature* salmon that pass through (or escape) fisheries and return to freshwater to spawn.⁵⁴

estuarine: of or related to the border zone between freshwater and marine environments.⁵⁵

exploitation rate: portion of all *adult* fish returning to their natal streams which are captured in a fishery.⁵⁶

extirpation: local extinction of a species.⁵⁷

fallow: in relation to *aquaculture*, the period of a few weeks between harvesting cycles when fish are absent from a site after harvesting and before the next restocking; also, the practice of site rotation where a site may be left empty for one or more years to allow the sediments to recover.⁵⁸

finfish: freshwater and marine fish species that include salmon and non-salmonid species such as trout and sablefish;⁵⁹ also called “true fish,” having a backbone, gills, and limbs in the shape of fins.

fish habitat: spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly to carry out their life processes.⁶⁰

fish ladder: structure designed to permit fish passage – for example, by providing access to spawning grounds upstream of a dam.⁶¹

fisheries resources: fish stocks or *populations* that sustain commercial, recreational, or Aboriginal fishing activities of benefit to Canadians.⁶²

flagellate: single-celled organism that uses a long cellular appendage for locomotion.⁶³

flood plain: flat or nearly flat land adjacent to a stream or river which experiences flood during periods of high water discharge.

food, social, and ceremonial: a fishing allocation for First Nations to fish for consumption for subsistence, social, and ceremonial purposes according to their distinctive culture.⁶⁴

Fraser River Panel: panel created under the Pacific Salmon Treaty which manages the commercial harvest of Fraser River sockeye and pink salmon in Fraser Panel Area Waters.⁶⁵

fry: life stage at which sockeye have emerged from gravel into freshwater streams, completed yolk absorption, and are less than a few months old.⁶⁶ See *life cycle*.

furunculosis: bacterial disease arising from an infection by the bacterium *Aeromonas salmonicida*.⁶⁷

gear: various equipment used for fishing.

genomic signature: characteristic pattern of gene expression, revealed on a micro-array.⁶⁸

gillnet: rectangular net that hangs in the water and is set from the stern or bow of a fishing vessel; when fish swim headfirst into the net, their gills get entangled in the mesh.⁶⁹

gonadal: referring to the gonads (the organs in an animal that produce eggs and sperm).

Heterosigma blooms: blooms of the fish-killing algae *Heterosigma akashiwo*.

histological analysis: analysis of the microscopic anatomy of cells and tissues.

histopathology: microscopic examination of cells and tissues to study the manifestations of a *disease*; used in diagnosis.

homeostasis: tendency of an organism to maintain a steady state or equilibrium with respect to specific functions and processes.⁷⁰

horizontal transmission: direct transfer of an infection from fish to fish.⁷¹

hydroacoustics: technology involving vessel and shore-based acoustic transducers to detect fish that are swimming.⁷²

hydrograph changes: changes in the rate of water discharge or flow.

immature: sockeye that are older than *postsmolt* but will not *mature* in the current calendar year⁷³ (includes life stages 2 and 3).

immunocompetence: ability of the body to produce a normal immune response.

immunogenetics: study of the relationship between the immune system and genetics.

immunosuppression: reduction in the ability of the immune system to deal with infection, increasing the susceptibility of the host to other pathogens.⁷⁴

indicator stocks: set of 19 Fraser River sockeye stocks for which a time series of *abundance* estimates has been maintained since 1952.⁷⁵

infectious hematopoietic necrosis (IHN): severe, acute, systemic viral *disease* found in *fry* and *juvenile salmonids*.⁷⁶

in-season management: management of the fishery as fish return to spawn; includes *run size* assessments, managing for *escapement* targets, and setting fishery opening and closing dates.⁷⁷

inter-annual variability: differences that occur from year to year.

inter-decadal variability: differences that are recorded over decades; for example, inter-decadal climate variability in the North Pacific Ocean can be observed as atmospheric and oceanic trends that last for 20–30 years (e.g., *Pacific Decadal Oscillation*).⁷⁸

intergenerational effects: cumulative effects that occur among generations of fish; for example, female sockeye experiencing warm water during egg development may produce offspring with lower fitness.⁷⁹

jacks: male *anadromous* sockeye salmon that mature after one year at sea.⁸⁰

jills: female *anadromous* sockeye salmon that mature after one year at sea.⁸¹

juveniles: the two sockeye salmon *life stages* at which *abundance* is estimated annually in freshwater – *fry* and *smolts*.⁸²

kokanee: *populations* of sockeye salmon that are non-*anadromous* and remain as freshwater residents throughout their *life cycle*.⁸³

La Niña: inter-annual climate variability event characterized by anomalous cool sea surface temperature and low sea level pressure; typically La Niña events lead to cool sea surface temperature in the waters off the west coast of North America.⁸⁵

landed value: price paid to the commercial fisher or salmon farmer for the whole fish before processing; in aquaculture, an alternative term is “farmgate value.”⁸⁴

Late run: one of the four *run-timing groups* of Fraser River sockeye; the Late run arrives in the Lower Fraser from late August to mid-October and spawns in the Lower Fraser, Harrison-Lillooet, Thompson, and Seton-Anderson systems; this run-timing group includes Cultus, Harrison, Late Shuswap, Portage, Weaver, Birkenhead, Miscellaneous Shuswap, and Late Miscellaneous non-Shuswap sockeye.⁸⁶

leachate: liquid that, in passing through matter, extracts solutes, suspended solids, or any other component of the material through which it has passed.

life cycle: salmon have discrete life phases: life stage 1 – eggs and incubation, *alevin*, *fry*; life stage 2 – *smolt* (downstream migration); life stage 3 – *sub-adult*, transition to marine environment; life stage 4 – *adult* (marine growth); and life stage 5 – *adult* (return migration, spawning, and death).⁸⁷

life stage: See *life cycle*.

limited entry fishery: fishery where no new licences are created, and the only way to acquire a licence is to purchase one from a current licence holder.⁸⁸

Lower Fraser Area: for the purpose of fisheries management, the Lower Fraser Area includes the mouth of the Fraser River up to Sawmill Creek.⁸⁹

mainstem: primary downstream segment of a river, as distinguished from its tributaries.

mariculture: cultivation, management, and harvesting of marine organisms in their natural habitat or in specially constructed rearing units; the end product is cultivated in seawater.⁹⁰

marine productivity: *productivity* in the marine environment.

mark-recapture: high-precision method for enumeration of *escapement*; a method commonly used in ecology to estimate the size of an animal *population*.⁹¹

mature: *adult* (includes *life stages* 4 and 5).

maximum sustainable yield (MSY): largest catch (yield) that can be taken on average from a *population* under existing environmental conditions without depleting the population; catch will vary annually because of variation in the survival rate of the population.⁹²

meta-analysis: statistical procedure for combining the results of several studies testing the same hypothesis.⁹³

metabolites: various compounds that take part in or are formed by metabolic reactions.⁹⁴

metabolism: sum of the chemical reactions that occur within a living organism.⁹⁵

micro-array: arrayed series of thousands of microscopic spots, each containing tiny amounts of a specific DNA sequence used as a probe to screen large numbers of samples.⁹⁶

mixed-stock fishery: fishery in which multiple stocks may be passing through an area in which the fishery is operating; the Fraser River sockeye fishery is generally considered a mixed-stock fishery.⁹⁷

morphology: study of the structure and form of organisms.⁹⁸

mortality: death of fish, or the number of fish killed through harvest or through the act of releasing species that cannot be retained in a fishery.⁹⁹

moult: act of casting off the outer layers of an animal's covering (e.g., hair, scales, feathers).

myxobacteriosis: infection caused by bacteria of the order Myxococcales.

myxozoa: diverse group of microscopic parasites of aquatic origin.

negative phase of the PDO: phase of *Pacific Decadal Oscillation* (a type of *inter-decadal* climate variability) characterized by warm and cool sea surface temperatures over the western and eastern North Pacific Ocean, respectively.¹⁰⁰

nest: depression dug in the gravel substrate by a spawning female sockeye salmon in which her eggs are deposited.¹⁰¹

net-pen facility: *aquaculture* facility that uses a net to contain fish, allowing water to pass through (as distinguished from a *closed containment facility*).

nitrate: ion consisting of one atom of nitrogen and three atoms of oxygen.¹⁰²

No Net Loss: principle by which the Department of Fisheries and Oceans strives to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada's fisheries resources due to habitat loss or damage may be prevented.¹⁰⁴

non-point source: discharges from a diffuse source; non-point sources include runoff from forest management areas, agricultural operations, municipal stormwater, or linear developments.¹⁰³

northern diversion route: return migration route through Johnstone Strait and the Strait of Georgia to the Fraser River.¹⁰⁵

nursery lake: See *rearing lake*.

ocean-entry year: the year in which a class of sockeye enters the ocean.

orthomyxovirus: RNA virus from the family Orthomyxoviridae.

osmoregulation: regulation of the levels of water and mineral salts in the blood to maintain *homeostasis*.

outlier: measurement or experimental result outside the expected range.

over-escapement: spawning *population* size that is larger than the optimal *escapement* goal;¹⁰⁶ also referred to as under-fishing.

overflights: aerial surveillance of fishing areas used as a technique to monitor fishing activity.¹⁰⁷

Pacific Decadal Oscillation: atmospheric and oceanic index used to describe the *inter-decadal* variability in the climate of the North Pacific Ocean.¹⁰⁸

Pacific salmon: salmon of the Pacific Ocean regions, of which 11 species are currently recognized in the genus *Oncorhynchus*.¹⁰⁹

Pacific Salmon Commission: commission formed under the *Pacific Salmon Treaty* which is directly involved in managing Fraser River sockeye.¹¹⁰

Pacific Salmon Treaty: bilateral agreement between Canada and the United States addressing the allocation and conservation of Pacific salmon.¹¹¹

Panel Area Waters: geographical area designated under the *Pacific Salmon Treaty* in which Fraser River sockeye and pink salmon management is subject to provisions of that treaty.¹¹²

parvovirus: one of a group of viruses with small, single-stranded DNA genomes.¹¹³

pathogen: agent (such as a virus, bacteria, or sea louse) that causes *disease*.¹¹⁴

pathogenicity: ability to cause *disease*.¹¹⁵

pelagic: of or relating to the open ocean, as opposed to the ocean bottom.¹¹⁶

phenological: an organism's biological response to climatic conditions.

phenols: class of organic compound with a hydroxyl functional group.

phytoplankton: small planktonic organisms, mostly single-celled algae, that manufacture their own food by turning sunlight into chemical energy; this process is called autotrophy.¹¹⁷

pilot sales fishery: Aboriginal communal economic fishery licensed under the *Aboriginal Communal Fishing Licenses Regulations*.¹¹⁸

placer mining: exploitation of placer mineral deposits (formed by gravity separation during sedimentation processes) for their valuable heavy metals.¹¹⁹

plasmacytoid: innate immune cells that circulate in the blood ready to respond to pathogens, but not specific to any particular type.¹²⁰

population: group of interbreeding organisms that is relatively isolated (i.e., demographically uncoupled) from other such groups and is likely adapted to the local habitat.¹²¹

positive phase of the PDO: phase of *Pacific Decadal Oscillation* (a type of *inter-decadal* climate variability) characterized by cool and warm sea surface temperatures over the western and eastern North Pacific Ocean, respectively.¹²²

postsmolt: *juvenile* salmon that has undergone the physiological changes necessary to live at sea, emigrated from freshwater, and in its first calendar year at sea.¹²³

pre-spawn mortality: females that have arrived on spawning grounds but die with most of their eggs retained in their body.¹²⁴

prevalence: percentage of individuals of a host species infected with a particular parasite species.¹²⁵

productive capacity: maximum natural capability of habitats to produce healthy fish, safe for human consumption, or to support or produce aquatic organisms on which fish depend.¹²⁶

productivity: numbers of returns per *spawner* by *brood year*.¹²⁷

protozoan: There is no exact definition, but the term often refers to unicellular heterotrophic, usually microscopic, eukaryotic organisms such as amoebas and ciliates.

purse-seine fishery: type of fishery involving the use of *seine* nets that are gathered at the bottom to form a “purse.”

rearing lake: freshwater lake used by sockeye *fry* to feed and grow before developing into the *smolt* stage.

recreational fishing (sport fishing): non-commercial fishing to provide food for personal use or as a leisure activity.¹²⁸

recruitment: See *recruits*.

recruits: also referred to as “returns”; the *abundance* of adults of a given sockeye *population*, usually estimated by summing the estimated number of *spawners* with abundances of fish that were caught in various fisheries.¹²⁹

redd: sequential series of *nests* dug by a single female *salmonid*.¹³⁰

refugia: places of refuge for salmon;¹³¹ for example, groundwater upwelling that augments stream flow in dry summer months provides localized cooling or “thermal refugia” for migrating *adults* and rearing *juveniles*.¹³²

resource management: departmental actions, policies, and programs affecting Pacific *wild salmon* directly or indirectly through their habitats and *ecosystems*.¹³³

retrovirus: any of a family of single-stranded RNA viruses containing an enzyme that allows for a reversal of genetic transcription, from RNA to DNA (rather than the usual DNA to RNA).¹³⁴

returns: catch plus *escapement*, by *ecotype*.¹³⁵

Ricker and Larkin models: two stock-recruitment models that are frequently used to describe Fraser River sockeye population dynamics.¹³⁶

riparian zone: area of vegetation near streams.¹³⁷

run size: one or more stocks of the same species that survive natural *mortality* agents and return to a given freshwater system in a given year.¹³⁸

run-timing groups: groups of fish characterized by the timing of their return migration: Early Stuart, Early Summer, Summer, and Late-run.

salmonid: a group of fish that includes salmon, trout, and char, belonging to the taxonomic family Salmonidae.¹³⁹

scare permit: permit issued by Environment Canada’s Wildlife Service that authorizes the scaring away of migratory birds; used by *aquaculture* operators.¹⁴⁰

scouring: physical disruption of eggs due to high stream flows generated by rainfall; a factor potentially decreasing the survival of eggs.¹⁴¹

sector: DFO sectors are national headquarters organizational divisions based on program activities;¹⁴² fishing sectors refer to and distinguish commercial, *recreational*, and Aboriginal fishers.

seine: fishing net that hangs vertically in the water with its bottom edge held down by weights and its top edge buoyed by floats; seine nets can be deployed from the shore as a beach seine or from a boat.

selective fishing: *conservation*-based management approach that allows for the harvest of surplus target species or *Conservation Units* while aiming to release *bycatch* unharmed or to minimize or avoid the harvest of species or stocks for which there is conservation concern.¹⁴³

senescence: deteriorating changes in a cell or organism with aging.¹⁴⁴

set net: *gillnet* anchored in position rather than drifted or manipulated by hand.

smolt: *juvenile* salmon that has completed rearing in freshwater and migrated into the marine environment. A smolt becomes physiologically capable of balancing salt and water in the estuary and ocean waters. Smolts vary in size and age depending on the species of salmon.¹⁴⁵

somatic: the body and its cells (as distinguished from reproductive cells).¹⁴⁶

spawner success: successful reproduction by *spawners*.

spawners: males and females that reach the spawning grounds.¹⁴⁷

stewardship: acting responsibly to conserve fish and their habitat for present and future generations.¹⁴⁸

stock: aggregate of *populations* of a single species that are grouped for management purposes. Stock generally have similar migration patterns and *run timing*.¹⁴⁹

stock assessment: use of various statistical and mathematical calculations to make quantitative predictions about the reactions of fish *populations* to alternative management choices.¹⁵⁰

stream walks: method of estimating salmon *spawner abundance* by walking along the banks of a stream and counting the number of fish.¹⁵¹

sub-adult: not yet *adult* or *mature*.

Summer run: one of the four *run-timing groups* of Fraser River sockeye; the Summer-run stock group spawns in the Chilko, Quesnel, Stellako, and Stuart systems and arrives in the Lower Fraser River from mid-July to early September; the run includes Chilko, Late Stuart, Stellako, and Quesnel sockeye.¹⁵²

superimposition of eggs: placement of eggs on or over other eggs.

surfactant: compounds that lower the surface tension of a liquid; or the interfacial tension between two liquids, or between a liquid and a solid.

systemic: in relation to disease, pertaining to the body as a whole.¹⁵³

tagging program: program that involves tagging of fish or other animals.

telemetry: science and technology of automatic measurement and transmission of data by wire, radio, or other means from a distance.¹⁵⁴

thermal stratification: change in temperature at different depths of a lake.

Tier 1, Tier 2, Tier 3: part of a three-tier process, involving discussions and organizational relationships among, respectively, First Nations only; First Nations and the federal government; and First Nations, the federal and provincial governments, and third parties.¹⁵⁵

total allowable catch: estimated quantity of fish that may be harvested or used in the development of fishing plans.¹⁵⁶

total return: sum of the estimated numbers of *adult* salmon of a population taken in the catch plus the

estimate of the number of *spawners* in that *population*, computed across all life-history types; sometimes called *brood-year* returns.¹⁵⁷

troll: to fish by trolling; trolling is a method of fishing where one or more fishing lines, baited with lures or bait fish, are drawn through the water.

upwelling: oceanographic phenomenon that involves wind-driven motion of dense, colder, and usually nutrient-rich water toward the ocean surface.

vectors: organisms that carry *disease*-causing micro-organisms from one host to another.¹⁵⁸

vibriosis: *disease* caused by infection with bacteria of the genus *Vibrio*.

virulence: measure of the severity of a *disease* or parasite's impact on its host's fitness.¹⁵⁹

visceral: pertaining to organs located in the chest and abdomen.¹⁶⁰

water mass: identifiable body of water with chemical and/or physical properties distinct from surrounding water.

weak stocks: fish stocks identified as having low *productivity*.¹⁶¹

wild salmon: Salmon are considered "wild" if they have spent their entire *life cycle* in the wild and originate from parents that were also produced by natural spawning and continuously lived in the wild.¹⁶²

yolk sac: sac containing yolk (nutritious material contained in an egg) that is attached to an embryo.¹⁶³

zooplankton: weakly swimming and drifting planktonic organisms, mostly *protozoa* and small animals such as crustaceans, which must consume *phytoplankton* (or detritus) to survive in a process called heterotrophy.¹⁶⁴

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